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No. 80

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CHEMISTRY

No. 80

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ADSORPTION

UDC 546.799.518:543.21:541.183.1

USE OF INORGANIC SORBENTS FOR ISOLATION, SEPARATION AND PURIFICATION OF TRANSPLUTONIUM ELEMENTS

Leningrad RADIOKHIMIYA in Russian Vol 23, No 4, Jul-Aug 81
(manuscript received 14 May 80) pp 489-498

BARSUKOVA, K. V. and MYASOYEDOV, B. F.

[Abstract] Inorganic synthetic sorbents, polymers of the group IV-VI metal hydroxides of amorphous salts, have the mechanical stability, resistance to high doses of radiation and high temperature and stability to highly acid solutions which are required for the purification of transplutonium elements. Despite reproducibility problems, much work has been accomplished, particularly on heteropolyacids like ammonium phosphomolybdate. Phosphates of zirconium, tin, titanium and hafnium, which have low acid solubility and high radiation stability, have been used for many studies. The mechanism of sorption is ion exchange in most cases, with retention a strong function of nitric acid concentration. Purification methods for plutonium using zirconium phosphate, zirconium phosphosilicate or titanium phosphate have been reported. Lanthanides, actinides and transuranium elements are only partially resolved by this method, though americium, curium, berklium, cerium and californium can be purified on zirconium phosphate and other similar sorbents. Changes in oxidation state are often used to advantage. The data indicate that these types of sorbents are promising for the purification of transuranium and other radioactive, rare, trace elements in complex mixtures. Figures 6; references 51: 19 Russian, 32 Western.
[7-12126]

UDC 669.882;621.039.325

SORPTION OF URANIUM FROM FLUORINE-CONTAINING SOLUTION ONTO AMINOPHOSPHORIC AMPHOLYTES

Leningrad RADIOKHIMIYA in Russian Vol 23, No 4, Jul-Aug 81
(manuscript received 11 May 80) pp 499-504

PAKHOLKOV, V. S. and RYCHKOV, V. N.

[Abstract] The sorption of uranium from solutions containing HF, $NH_4 \cdot HF$ and NH_4F onto the aminophosphoric acid ampholytes ANKF-1B, -2B, -3G, -80 and -86 and the behavior of the metal on desorption were studied. Sorption was found to decrease in most cases with increasing concentration of HF or NH_4F in the solution. Sorption curves indicate that cation-exchange and sorption of UO_2^{2+} and UO_2F^+ are occurring. Ampholyte ANKF-3G is the strongest, due to the ion-exchange properties of its pyridine groups. Infrared spectra confirm the participation of the ampholyte in ion exchange and its coordination with uranyl ions, with uranium fluoride complexes coordinating with the ampholyte amino nitrogen. Sorption isotherms were found to be convex. Calculations of exchange constants, average charge of the sorbed ion and pH changes were in complete agreement with IR results. The strong absorption of U(VI) from a fluoride-containing solution onto acrylate-based ampholytes (ANKF-80 and -86) can be used to separate it from beryllium, zirconium, hafnium and niobium. Uranium is easily desorbed with 1-2 mole/1 $NH_4F \cdot HF$ or NH_4F. Desorption from the other ampholytes proceeds too slowly and requires too much eluant, unless ammonium or sodium carbonate solutions are used. Figures 4; references 12: 11 Russian, 1 Western.
[7-12126]

UDC 541.183

DYNAMICS OF ADSORPTION OF SALTS OF NITROCYANAMIDE FROM AQUEOUS SOLUTIONS ON ACTIVATED CHARCOAL

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 10, Oct 81
(manuscript received 27 Feb 80) pp 2318-2321

ANDREYEV, V. N., TSELINSKIY, I. V., SELIVANOV, V. F., BULGAKOV, O. V. and PUL'TSINA, T. S., Leningrad Technological Institute imeni Lenovet

[Abstract] A study of problems related to the adsorption of potassium, ammonium, strontium and barium salts of nitrocyanamide from aqueous solutions on activated charcoal showed that these salts possess extremely high kinetic and equilibrium characteristics of adsorption of aqueous solutions on activated charcoal. The greater the energy of adsorption of these salts the lesser their contribution to positive hydration. The lower adsorbability of barium salt than expected from the nature of its effect on the structure of the solvent was due to the steric factor which caused part of the porous exchange of activated charcoal to be unavailable for this dissolved substance. Figures 3; references 2 (Russian).
[48-2791]

UDC 543.614.3

ANALYTICAL PROBLEMS OF INVESTIGATING COMPONENTS OF FOOD PRODUCT ODORS AND ODORS OF OTHER BIOLOGICAL MATERIALS

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 36, No 7, Jul 81 (manuscript received 21 Aug 80) pp 1390-1420

GOLOVNYA, R. V. and MISHARINA, T. A., Institute of Elementary Organic Compounds, USSR Academy of Sciences, Moscow

[Abstract] The general characteristics of volatile components that determine the odor of biological objects such as food products are outlined with respect to analyzing these components. The main methods of isolation and concentration of volatile organic substances are outlined from a survey of the literature. Gas chromatographic analysis is used to separate trace amounts of organic substances in food products. The investigation of the volatile components of biological objects is related to an independent section of analytical organic chemistry. It is recommended that complex analytical methods be developed intensively so as to establish the complete structure of a substance without destroying it. Figures 3; references 197: 64 Russian, 133 Western. [136-6521]

UDC 543.42.062:546.78

DIFFERENTIAL SPECTROPHOTOMETRIC DETERMINATION OF TUNGSTEN IN PRESENCE OF URANIUM

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 36, No 10, Oct 81 (manuscript received 11 Dec 80) pp 1971-1975

PRIVALOVA, M. M., TULINA, M. D. and POLYAKOVA, L. F., Physical Power Institute, Obninsk

[Abstract] Tungsten was measured by differential spectrophotometry in the presence of comparable and excess quantities (400-500-fold) of uranium (VI) by the thiocyanate method. A tungsten-thiocyanate solution was obtained with

a color stability of 2.5-3 h. The addition of phosphoric acid (about 2.5 M), which had a negligible effect on absorption of the tungsten-thiocyanate complex, effectively eliminated interference by U(VI) and prevented the formation of a U(IV) thiocyanate complex. Reproducibility of the differential spectrophotometric determination of tungsten concentration had an average standard error of 0.007, and 0.002-0.003 if optimal conditions were maintained. Standard error in determining tungsten in the presence of uranium (U:W = 2.5:1) by differential measurement was 0.0017. Error increased at higher U:W ratios. This method was acceptable for rapid spectrophotometric determinations of tungsten without preliminary separation of elements. Figures 4; references 14: 3 Russian, 11 Western.
[38-9307]

UDC 66.023.23.096.5:663.13

HYDRODYNAMIC AND MASS EXCHANGE CHARACTERISTICS OF TOWER FERMENTOR WITH FLOATING PACKING

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, Sep 81 pp 551-554

VINAROV, A. Yu. and SHERSTOBITOV, V. V.

[Abstract] The effect of gas flow rate on the height of the gas-liquid layer and its gas content, and on the rate of oxygen transfer from gas to liquid was studied in a five-section fermentor (100 and 200 mm in diameter) with floating packing at a column gas flow rate W_g - 0.1-1.5 m/s and a liquid-to-gas load ratio L/G = 2-30 kg/kg. The dependence of hydrodynamic interactions on L/G was determined. The sulfite procedure was used to determine mass-exchange characteristics. These results may be used in the design of tower fermentors with floating packing. Experimental data were obtained for continuous cultivation of Candida cells on a hydrocarbon substrate. Figures 5; references 7 (Russian).
[20-9307]

UDC 546.791.6:547.491

URANYL COORDINATION COMPOUNDS WITH DICYANAMIDE GROUPS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 47, No 10, Oct 81
(manuscript received 18 Feb 80) pp 1024-1026

IVANOVA, Ye. I., SKOPENKO, V. V. and KELER, Kh., Kiev State University
imeni T. G. Shevchenko

[Abstract] Uranyl coordination compounds with dicyanamide groups were synthesized and analyzed: $UO_2L_2[N(CN)_2]_2$, where L may be diantipyrinemethane, propyl- and phenyldiantipyrinemethane, 2,2'-dipyridyl, 1,10-phenanthroline, triphenylphosphine oxide, dimethyl sulfoxide and 1,4-dioxane; and A, antipyrine and hexamethylphosphotriamide. IR-spectra of these compounds were studied in the region of 3000-400 cm^{-1}. In compounds with diantipyrinemethane and its derivatives, the ligands were coordinated at oxygen and occupied two coordination sites. Compounds with dipyridyl and phenanthroline were similar in structure. Bands were observed in the region 920-940 cm^{-1} in IR spectra of all compounds; these may be attributed to $\nu_{as}(UO_2^{2+})$. References 7: 6 Russian, 1 Western.
[37-9307]

CHEMICAL INDUSTRY

KSTOVO SENDS ETHYLENE, PROPYLENE TO DZERZHINSK BY PIPELINE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 30 Oct 81 p 1

[Article by V. Noskov (Kstovo, Gor'kovskaya Oblast): "A Pipeline Goes into Operation"]

[Text] Operation of the pipeline that connects two of the largest petrochemical associations--Kstovo's Gor'kneftorgsintez and Dzerzhinsk's Kaprolaktam--has started. Thanks to the startup of this steel arterial, tens of types of synthetic materials for all branches of the national economy will be obtained from the ethylene and propylene produced by Kstovo's petrochemical workers.

The petrochemical workers adopted increased socialist commitments at a meeting that was held in honor of the pipeline's startup.

11409
CSO: 1841/52

GOSPLAN OFFICIAL REVIEWS KAZAKH CHEMICAL INDUSTRY

Alma Ata KAZAKHSTANSKAYA PRAVDA in Russian 21 Oct 81 p 2

[Article by Yu. Pod"yachev, chief of the Chemical and Petrochemical Department of the Kazakh SSR Gosplan (KazTAG): "The Chemical Industry of Kazakhstan"]

[Text] The decisions of the 26th CPSU Congress stress that the all-round intensification of national production and heightened production efficiency will represent the basic line of economic development in our country in the next few years and in the more distant future.

The chemical industry has been assigned an important role. Along with the fuel and energy branch, electronics, instrument building and the production of automation equipment, it has been assigned priority as a powerful accelerator of socialist economic development. For this reason, the chemical industry will develop more quickly than industry as a whole.

Kazakhstan will play a significant part in the further development of chemical production. In the 10th Five-Year Plan the amount invested in the development of the republic chemical and petrochemical industry exceeded 1.6 billion rubles, or almost twice as much as in the preceding 5 years. This made it possible to speed up the further development of the phosphate raw material base in the Karatau-Dzhambul zone and increase the output of yellow phosphorus, mineral fertilizer, thermal phosphoric acid, sodium tripolyphosphate and synthetic detergents.

The nation's four most powerful electric furnaces for the production of yellow phosphorus are operating at the Novodzhambul Phosphorus Plant. All phosphoric fines are sintered. This has been a significant achievement in the better preparation of crude resources. A great deal of preparatory work has been performed for the construction of a second raw material base for crude phosphate in the republic from the Chilisayskoye deposit. The nation's largest plant for the production of polystyrene is now operating in Shevchenko. The opening of this plant has made the complete use of casing-head gas and petroleum refining by-products possible. These products, which were regarded as waste just yesterday, are now used in the manufacture of valuable types of plastic. The last five-year plan was marked by the birth of a new branch of the republic chemical industry--the tire industry. The construction of the first section of a plant for the production of "footwear" for motor vehicles and agricultural equipment was completed in Chimkent. The retooling of several shops also increased the output of the chemical industry's "daily bread"--sulfuric acid.

All of this, along with the liquidation of a number of obsolete and dilapidated production units, has considerably raised the technical level of the republic chemical and petrochemical industry. The level of mechanization and automation has risen, working conditions are better and product quality has improved.

There are still some shortcomings, however, in the industry. The main one is the insufficient use of existing capacities, particularly those for the production of yellow phosphorus, mineral fertilizer, polyvinylchloride filament staple and industrial rubber goods. The industry's work is also being impeded by incomplete projects, shortages of equipment, the use of technological processes that have not been tested under experimental industrial conditions, the use of raw materials without the necessary properties, etc.

Industry objectives for the 11th Five-Year Plan include a rise in the technical level of raw material processing, the more efficient and economical use of resources and the improvement of product quality. The stepped-up development of the republic phosphate resource base is being given special attention. Capacities for ore extraction in the Karatau basin will be considerably augmented. The preliminary preparation of ore will simultaneously be improved by increasing the output of finely ground phosphorites. The progressive method of preparing raw materials for the electric sublimation of yellow phosphorus will be perfected in experimental industrial areas. This technology will be fully incorporated in the next 5-year period.

The engineers of the second raw material base for phosphorites are also looking a decade ahead. Ore mining and the production of concentrate will begin at the Chilisayskoye pit during the current 5 years. Besides this, the production of wet-process phosphoric acid and of ammophos, a valuable complete fertilizer, will be mastered here in the future. Production volumes will be much greater at existing enterprises of the Fosfor and Khimprom associations as a result of more progressive technology for the preparation of raw materials.

An important objective of the current five-year plan is the expansion of the assortment of chemical products and the quicker incorporation of new capacities. The production of large tires for the K-701 tractors will be mastered at a Chimkent plant. The plastics plant will be working at its full planned capacity--210,000 tons of polystyrene. This will not only satisfy the demand for this product in industrial enterprises in the country but will also increase the output of plastic consumer goods.

The technical level of the branch will rise considerably as a result of the replacement of outdated and worn equipment, the remodeling of production areas, the incorporation of large production units with assemblies and technological lines of great individual capacity and the widespread use of the latest scientific and technical achievements.

The specialization of the chemical industry will continue. It will mainly produce yellow phosphorus, thermal phosphoric acid, sodium tripolyphosphate, phosphate nutrients, carbide calcium and chrome compounds.

Significant measures are being taken to improve product quality. Four types already meet world standards, and our ammophos, synthetic rubber, chromic oxide, synthetic detergents and other products can compete with the best our country has to offer.

The output of goods for cultural and consumer purposes and housewares has increased more than sixfold as a result of the incorporation of capacities for the production of synthetic detergents in the Fosfor Association in Chimkent and the organization of the production of tires, cameras, industrial rubber goods and spare parts for passenger cars, motorcycles and bicycles. The manufacture of metallic tile, cast iron and steel, photographic equipment and other goods will be organized.

Operational engineers, scientists and designers are now mainly concerned with finding more progressive ways of enriching phosphoritic ores, using them and their by-products more completely, planning more economic ways of giving raw materials the necessary technological properties and reducing the amount of time required for the mastery of new technological processes. This will aid in heightening production efficiency and performing the tasks set by the 26th CPSU Congress for the workers of the republic chemical industry.

8588
CSO: 1830/52

UDC 677.8

STATUS AND PROSPECTS FOR DEVELOPMENT IN CHEMICAL TECHNOLOGY FOR TEXTILE MATERIALS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA
in Russian Vol 26, No 4, Jul-Aug 81 pp 363-368

MEL'NIKOV, B. N., professor, doctor of technical sciences, Ivanovo Chemical-Technological Institute

[Abstract] Some of the most important advancements in the textiles technology industry, based on current journal articles and patents, are reviewed. The increasingly rapid processing rate of textile fibers has required the development of methods for increasing the concentration of reagents in the working solutions, implementation of higher temperature processes, and testing and applying of effective catalysts to increase the reaction rates for dyes, bleaches, and finishes as well as for the fibers themselves. Increasing the sodium or alkali content of bleach or dye solutions can reduce the processing time. Tri- or perchloroethylene can be used effectively to remove hydrophobic compounds from the fibers. Promising new technologies for the future include plasmochemical processing of fibers to introduce new active functional groups and radicals into the surface layers, the use of high- and ultrahigh-frequency heating for the thermal stabilization of synthetic fibers, and high-temperature fixation and the use of water-organic-solvent azeotropic vapors for dyes. These and other inovations promise to improve many aspects of the textiles industry, including processes for preparing, dyeing, printing, and finishing textile goods. Figure 1 (photo of author); references 45: 40 Russian, 5 Western.
[154-12027]

TECHNICAL RE-EQUIPPING OF FIBERGLASS AND GLASS-REINFORCED PLASTICS INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 81 pp 3-4

BASKOV, B. I., KOROL'KOV, N. V. and CHEREMISIN, V. P.

[Abstract] The measures required to increase the volume of production in the fiberglass and glass-reinforced plastics industry are discussed with respect to the tasks of the 11th Five-Year Plan. The refractories of the glass-making furnaces will be replaced for production of glass spheres of alumoborosilicate composition. Glass-melting vessels with 800 spinnerets have been developed and recommended for use in a two-stage process to produce continuous glass fibers. New production processes using shuttleless machines will be introduced to increase production of glass fabric and thermochemical processes will be used to treat glass fabric. An increase of glass fiber-reinforced plastics production will be achieved by increasing the capacities of existing enterprises. New capital construction will accompany the measures to increase productivity in this sector of the economy.
[138-6521]

ACHIEVEMENTS OF UFA TEXTILE FIBERGLASS PLANT PRAISED

Moscow PLASTICHESKIYE MASSY in Russian No 7, Jul 81 p 4

SHCHEGLOV, N.

[Abstract] The 20th anniversary of the Ufa Textile Fiberglass Plant, one of the largest and leading enterprises of the fiberglass and glass fiber-reinforced plastics industry, was celebrated this year. Products worth more than 31 million rubles were produced above the Plan, including approximately 5,000 tons of glass fiber and more than 14 million meters of glass fabric. Output of national consumer goods increased 6.8-fold and output of glass fiber-reinforced plastics increased 2.4-fold during the 10th Five-Year Plan. The State Emblem of Quality was awarded to 14 different products. Vessels with 600 and 800 spinnerets were introduced for fiberglass production as part of reconstruction of the electric furnace shops. An increase of production volume by 21 percent, of the output of glass fiber-reinforced plastics and consumer goods 1.5-fold and increase of labor productivity by 24 percent are planned for the 11th Five-Year Plan.
[138-6521]

UDC 658.012.011.56

MODEL OF OPTIMUM OPERATIONAL PLANNING OF CHEMICAL PLANTS WITH VARIABLE COEFFICIENTS OF OUTPUT AND EXPENDITURES

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNOLOGII in Russian Vol 15, No 4, Jul-Aug 81 (manuscript received 25 Jul 78) pp 625-629

RZAYEV, T. G., Scientific Research and Planning Institute "Neftekhimavtomat", Sumgait

[Abstract] A direct and simple method of constructing a linear analog of model chemical plants, with variable output coefficients and expenditures, is proposed. that eliminates previous deficiencies. All the input and output flows of constructing the plant model for each production run, with exception of input flows which are direct outputs of other production runs, are taken as independent variables. Parts of intermediate products produced as goods and received from outside as raw material are also taken as variables. The advantage of the given approach of constructing a linear analog for the operational planning model of chemical plants is shown over the linearized model when there are variable output coefficients and expenditures. The structural simplicity of the model permits one to recruit the average number of engineering personnel from the plant to construct it. The problem of optimum operational planning of a plant was also solved with fixed values of variables of output coefficients and expenditures. Plant profits can be increased by approximately 90,000 rubles when compared to the optimum solution found with fixed values of output coefficients and expenditures. Figures 1; references: 7 Russian.
[133-6521]

UDC 541.135.3

TEMPERATURE DEPENDENCE OF DIFFUSION COEFFICIENTS OF TRIVALENT URANIUM IONS IN CHLORIDE AND CHLORIDE-FLUORIDE MELTS

Moscow ELEKTROKHIMIYA in Russian Vol 17, No 7, Jul 81
(manuscript received 24 Mar 80) pp 983-987

KOMAROV, V. Ye. and BORODINA, N. P., Sverdlovsk

[Abstract] The diffusion coefficients of uranium ions in 3LiCl-2KCl chloride in mixed chloride-fluoride 3LiCl(LiF)-2KCl melts were measured by the chronopotentiometric method in the temperature range of 633-1,235 K. The experimental values of the diffusion coefficients essentially plot as a straight line in coordinates of lgD - 1/T in a 3LiCl-2KCl melt in the investigated temperature range. The strength of the complex groupings formed by the investigated cations with anions of the surrounding medium affect the contribution of the intermittent component. The diffusion coefficients of the different ions in the melts increase as temperature increases. The experimental values of the diffusion coefficients deviate from the Arrhenius equation toward an increase as the temperature in the chloride-fluoride melt is elevated to 1,235 K. Figures 3; references 16: 11 Russian, 5 Western.
[134-6521]

FERTILIZERS

UDC 661.635.213:622.364.1(574)

PRODUCTION OF AMMOPHOS FROM KARATAU PHOSPHATE ROCK

Moscow KHIMICHESKAYA PROMYSHELNNOST' in Russian No 9, Sep 81 pp 536-538

LI, M. G., TYAN, A. I., APTUKAYEV, N. S., ZHDANOV, Yu. F., KONYUKHOVA, Ye. B., BELOZEROV, L. P. and SHUVAYEVA, G. N.

[Abstract] The operation of an ammophos plant is analyzed. The raw material for ammophos was extracted phosphoric acid obtained from unsorted Karatau phosphate rock. Neutralization of phosphoric acid by gaseous ammonic in a high-speed evaporator-ammoniator, evaporation of the ammoniated pulp in a vacuum evaporator with forced circulation and an external boiling zone, and granulation and drying of evaporated pulp in a drum dryer with new-design fins were the major stages of ammophos production. The technical parameters of neutralization, evaporation and granulation and drying are presented. Because of the high level of suspended matter in the original phosphoric acid, the content of 1-mm fractions in the final product increased to 15-20%. Dust production during shipping was also higher. A portion of the product was sold as grade 1, brand B. Recommendations are made for improving equipment operation and design, for fuel economy and for the plant layout. Figure 1.
[20-9307]

UDC 621.928:661.632.232

ANALYSIS OF CLASSIFICATION OF DOUBLE SUPERPHOSPHATE

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 9, Sep 81 pp 538-539

TRUSOV, B. K., GRISHAYEV, I. G. and ZAVIDKOV, V. A.

[Abstract] The grading of double superphosphate after the granulator stage is difficult because of its tendency to stick. The operation of electromagnetic screens arranged in cascades, which are used for sorting, was analyzed. Higher acidity, temperature and moisture content of double superphosphate and a high content of fractions less than 1 mm in size reduced screen operating time between

cleanings. The effect of screen unit load on the efficiency of sorting 1- and 4-mm granules of double superphosphate was determined. Screening efficiency at the upper and lower size limits decreased as the screen load increased. The allowable efficiency depended on unit load determined by the quality of the initial products. Equations are given for determining screen unit load during sorting of 1-mm granules as a function of the amount of fractions less than 1 mm in size in the initial product. Figures 2; references 3 (Russian).
[20-9307]

UDC 543.544.6:546.791+546.56

CALCULATION AND OPTIMIZATION OF PROCESS OF EXTRACTING COPPER AND URANIUM BY TWO-STAGE ION EXCHANGE SCHEME

Leningrad RADIOKHIMIYA in Russian Vol 23, No 4, Jul-Aug 81
(manuscript received 10 Aug 79) pp 505-511

SOROCHAN, A. M., SALDADZE, K. M., KATS, E. M., KOMAROVA, I. V.,
PRON', S. V. and STROGANOVA, N. V.

[Abstract] A variant of the two-stage process for isolating metals from sea water is proposed. The method involves three parallel columns of anion exchanger AN-31 or AN-2F, from which the metals are desorbed with 0.5 mole/l HCl and passed onto the phosphoric acid cation exchanger KF-7, for uranium, or the pyridine carboxylic ampholyte ANKB-2, for copper. Uranium is desorbed with 0.25 mole/l ammonium carbonate, copper with 8.5 mole/l sulfuric acid. Complete desorption from the first phase was accomplished with twenty column volumes at a flow rate of ten column volumes per hour. Sorption distribution coefficients were 1.4-5 x 10^3. Backflow experiments confirmed the internal diffusion nature of the sorption and that AN-31 is more suitable for copper and AN-2F for uranium. A kinetic model developed by Semgavin and Rubinshteyn agrees with experimental findings. Cost per weight of metal isolated was calculated and showed that one hour sorption time, 75% regeneration of the column, small column volumes on the order of 0.3 l and 1-2 m^3/hour flow rate of sea water starting material were optimum. Flow rate on the second stage columns was about 80 ml/min. Linear isotherms for sorption were obtained with an internal diffusion mechanism for copper on ANKB-2 and a mixed diffusion mechanism for uranium on KF-7. Productivity of the apparatus was 0.5-2 g/month with a degree of concentration of 3-4 x 10^5. Figures 3; references 12: 7 Russian, 5 Western.
[7-12126]

UDC 678.183.123.541.15

DESTRUCTION OF KY-2X8 AND AB-17X8 IONITES AFTER HIT IN FIRST LOOP OF WATER-MODERATED WATER-COOLED POWER REACTOR

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 54, No 10, Oct 81
(manuscript received 30 Jan 80) pp 2218-2221

TULUPOV, P. Ye., BUTENKO, T. Yu. and RADAYEV, Ye. F., Far Eastern Scientific Center Institute of Chemistry, USSR Academy of Sciences

[Abstract] A detailed study of the basic products of destruction of cationite KY-2X8 and anionite AB-17X8 in water and ammoniacal solutions with pH = 9-11 at 260°-280° is described and discussed. Hits of ionites KY-2X8 and AB-17X8 in the first loop were accompanied by accumulation in the coolant of products of conversion of styrene (carbonic acide, phenol, methane, hydrogen, diphenol and carbon dioxide), amines (ammonia and methanol), methanol (formaldehyde, formic acid, hydrogen and carbon dioxide) and sulfonic acids (sulfate and phenol). Most of these compounds can be removed from the coolant by the use of standard ion exchange filters. Figures 2; references 9 (Russian).
[48-2791]

ORGANOMETALLIC COMPOUNDS

UDC 547.26'118:547.241:541.49

THERMODYNAMIC PARAMETERS OF REACTION OF COMPLEXING OF DIALKYLPHOSPHOROUS ACIDS WITH [illegible] ALKYLCHLORIDES

Ivanovo IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: KHIMIYA I KHIMICHESKAYA TEKHNOLOGIYA in Russian Vol 24, No 10, Oct 81 (manuscript received 17 Mar 80) pp 1314-1315

YARKOVA, E. G., SAFIULLINA, N. R. and MURATOVA, A. A., Chair of Organic Chemistry, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] Thermodynamic parameters of reactions of complexing dialkylphosphorous acids with stannous alkylchlorides were determined and the possibility of the use of the band shift of stretching vibrations of the P - H bond during complexing (Δvp-H) as a relative measure of donor acceptor interaction in complexes of organophosphoric compounds containing P (O) H groups. Values of enthalpies of complexing were obtained and values of $\Delta H°$ with $\Delta\nu$ vp-H were correlated. Results of the study confirmed the assumption previously expressed by A. N. Pudovik and others that values of Δ vp-H can be used as a relative measure of donor-acceptor interaction in complexes of organophosphorus compounds containing the P (O) H group. Figure 1; references 3: 2 Russian, 1 Western.
[49-2791]

UDC 542.91:547.1'118:541.49:546.98

SYNTHESIS OF TETRANUCLEAR CARBONYLTRIALKYLPHOSPHINE CLUSTERS OF Pd(O)

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 81 (manuscript received 11 May 81) pp 2400-2402

MEDNIKOV, Ye. G. and YEREMENKO, N. K., Complex Division of Physical-Chemical and Ecologic Problems, Institute of Inorganic Chemistry, Siberian Branch, USSR Academy of Sciences, Kemerovo

[Abstract] Tetranuclear carbonyltrialkylphosphine clusters of Pd(O) were obtained with the structure $Pd_4(CO)_5(PAlk_3)_e$ where Alk = n-Bu and Et. The

complex was obtained by adding, consecutively, $NaOAc \cdot 3H_2O$, AcOH, $Pn\text{-}Bu_3$ and H_2O to a mixture of $Pd(OAc)_2$ in acetone, stirring the mixture for 16 hrs in CO atmosphere and adding a 5:5:1 mixture of $Me_2CO\text{-}H_2O\text{-}AcOH$. The yield was about 90%. IR spectral data are reported. Based on analogy to other clusters, the structure for these compounds was proposed to be an open tetrahedron with CO bridges. References 4 (Western, one by Soviet authors).
[42-7813]

ORGANOPHOSPHORUS COMPOUNDS

UDC 541.63:547.1'118

STERIC STRUCTURE OF PHOSPHORUS-CONTAINING HETEROCYCLICS, REPORT 24: CONFORMATION OF 2-X-4,5,6,7-DIBENZ-1,3,2-DIOXAPHOSPHEPANES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian, No 4, Apr 81 (manuscript received 9 Jun 80) pp 784-787

ARBUZOV, B. A., KADYROV, R. A., ARSHINOVA, R. P. and MUKMENEVA, N. A., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin, Kazan' Chemical Technological Institute imeni S. M. Kirov

[Abstract] A study is reported of the steric structure of the title compounds wherein X is a Cl in compound (I), EtO in compound (II) and PhO in compound (III). Based on considerations of bond length, dipole moment, and van der Waals interactions, the spatial positions of the various moieties was established. Compounds (I)-(III) have a twisted form. The rotation around the bond connecting the two aromatic rings is about 41° to 48°. Compounds (II) and (III), having an exocyclic P-O bond, are also capable of internal rotation about this bond. The ethoxy-substituted analog (II) has a gauche orientation of the ethyl relative to the unpaired pair of electrons on P^{III}, while for the phenoxy form (III), the cis form has the lower energy. Figures 3; tables 2; references 10: 7 Russian, 3 Western.
[101-12027]

UDC 542.91:547.1'118;547.539.151

PHOSPHORYLATION OF POLYFLUORINATED AROMATIC COMPOUNDS, REPORT 3: MICHAELIS-BEKKER REACTION FOR SERIES OF POLYFLUORINATED BENZENE DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 81 (manuscript received 15 Apr 80) pp 867-869

MARKOVSKIY, L. N., FURIN, G. G., SHERMOLOVICH, Yu. G. and YAKOBSON, G. G., Novosibirsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences, Institute of Organic Chemistry, UkSSR Academy of Sciences, Kiev

[Abstract] The title reaction results in formation of methyl and ethyl esters of polyfluoroarylphosphonous (PFAP) and thiophosphonous acids, depending on the respective derivatives of polyfluorinated benzene. Other products which can be obtained include the dimethyl and diethyl esters of 2,3,5,6-tetrafluoropyridylic acid with a yield of 10-65%. Specific experimental conditions and yields are listed. It was expected that this reaction would occur most easily in aprotic bipolar solvents. However, use of the solvents dimethyl-formamide, dimethyl sulfoxide, sulfolane, and acetylnitrile lead to a decrease in the yields of the ethyl and diethyl esters. No polyphosphorylated product was observed for the reaction of PFAP with the Na-salts of dimethyl- and diethyl-phosphites at 70-80° C. Figures 1; references 8: 4 Russian, 4 Western.
[101-12027]

UDC 542.91:541.69:547.1'118

SYNTHESIS AND ANTICHOLINESTERASE ACTIVITY OF S-BETA-ARYL(BENZYL)MERCAPTO-ETHYL ESTERS OF PHOSPHORUS THIOACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 81 (manuscript received 25 Jun 80) pp 879-883

BERKHAMOV, M. Kh., ZAKHAROVA, L. M., GRINEVA, L. G., KUZAMYSHEV, V. M., OL'KHOVAYA, G. G., BEKANOV, M. Kh., AGABEKYAN, R. S., GODOVIKOV, N. N. and KABACHNIK, M. I., Kabardino-Balkarsk State University, Nal'chik; Institute of Hetero-organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The title study was carried out on the reaction of twelve thioesters of phororic acids with acetyl- or butyryl-cholinesterase. An examination of the extent of inhibition of acetocholinesterase (ACHE) or butyrylcholinesterase (BuCHE) shows that the presence of the C_6H_5 or $CH_2C_6H_5$ in the cleaving part of the molecule allows for a better orientation of the inhibiting molecule with respect to the active surface of the enzyme, apparently due to a hydrophobic adsorption. This results in more effective inhibition. Little difference is observed between the benzyl- and phenyl-substituted compounds. The effect of the substituents on the P atom is less

and apparently more complicated than that exerted by the substituents of the S atom. The hydrophobic substituents increase the inhibitation by both a direct and an indirect mechanism. Figure 1; references 11: 10 Russian, 1 Western.
[101-12027]

UDC 542.91:547.1'118

PHOSPHORYLATION OF PHENOXYACETYLENE WITH PHOSPHOROUS PENTACHLORIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 81 (manuscript received 23 Jul 80) pp 898-900

RYBKINA, V. V., ROZINOV, V. G., GLUKHIKH, V. I., LYASHENKO, G. S. and FILIPPOVA, A. Kh., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences; Institute of Petroleum- and Carbon-Chemical Synthesis of the Irkutsk State University

[Abstract] The complex β-phenoxy-β-chlorovinyltrichlorophosphonous-hexachlorophosphate ($PhCPCl{=}CHPCl_3^+ \cdot PCl_6^-$ (III) and the phosphonous acid form ($PhOCCl{=}CHPOCl_2$) (IV) are among the products of the title reaction. The formation of E- and Z- isomers of (III) is evidence either of the isomerization of a single initial configuration or of the multiple electrophilic levels present during the phosphorylation reaction such that the addition occurs in both the cis and trans positions. A reasonable mechanism is suggested for the latter case. The ratio of E- to Z- isomers remains virtually the same during the conversion of (III) to (IV). The conversion of a mixture of E- and Z- isomers of the complex $EtOCH{=}CHPCl_3^+ \cdot PCl_6^-$ resulted in only the E-isomer of β-ethoxyvinyl-phosphonous acid dichloroanhydride together with the hydrochloride of the corresponding alkenylphosphonous acid. The dichloroanhydrides of β-phenoxy-β-chlorovinyl- and β-alkoxyvinylphosphonous acids add HCl across the double bond; alkoxyvinyltrichlorophosphonous hexachlorophosphates do not react with HCl. Figure 1; references 6 (Russian).
[101-12027]

UDC 547.495.1

N-ALKYLIDENECARBAMOYLISOCYANATES: REACTIONS WITH PHOSPHORUS CHLORIDES

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 7, Jul 81 (manuscript received 12 Jun 80) pp 1389-1392

GERTSYUK, M. N., GORBATENKO, V. I. and SAMARAY, L. I., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The reactions of isocyanates with phosphorus chlorides were studied using N-alkylidenecarbamoylisocyanates with phosphorus trichloride,

phosphorus pentachloride and phosphorus chloroxide. An exchange reaction occurs upon boiling of N-alkylidenecarbamoylisocyanates with phosphorus trichloride, resulting in formation of isocyanate phosphoric acid, with good yield of α-chloroalkylisocyanate and dichloroanhydride. All the reactions took place in anhydrous solvents under conditions that eliminate atmospheric moisture from affecting them. References 10: 8 Russian, 2 Western.
[126-6521]

UDC 547.26.118.07

TERT-BUTYL PEROXIDES OF PHOSPHAZOSULFONYLARYLS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 47, No 7, Jul 81
(manuscript received 18 Sep 79) pp 749-750

BABYAK, A. G. and PODA, A. K., Ternopol' Financial and Economic Institute

[Abstract] The reaction of trichloro- and phenyldichlorophosphazosulfonylaryls with tert-butyl hydroperoxide and its sodium salt was carried out to produce tri(di)peroxides of phosphazosulfonylaryls. The reactions were carried out in a medium of dry organic solvents of ether and benzene in the presence of Na_2SO_4 at 8-12° to produce phenylditert-butylperoxyphosphazosulfonylaryls. The peroxides and the chlorophosphazo derivatives are easily hydrolyzed by atmospheric moisture and have low thermal stability. The reaction must be carried out in a medium of easily volatile anhydrous solvents at reduced temperature to prevent this. A mixture of products difficult to dissolve is formed by the reaction between chlorophosphazo derivatives and tert-butyl hydroperoxide in the presence of hydrogen chloride acceptors. References 4: 3 Russian, 1 Western.
[135-6521]

UDC 547.241:541.128.135

MICELLAR CATALYSIS: II. EFFECT OF NATURE OF SURFACE-ACTIVE SUBSTANCE ON ALKALINE HYDROLYSIS OF O-ISOBUTYL-O'-n-NITROPHENYLMETHYLPHOSPHONATE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 17, No 8, Aug 81
(manuscript received 23 Jun 80) pp 1668-1673

BEGUNOV, A. V., RUTKOVSKIY, G. V. and KUZNETSOV, S. G.

[Abstract] The effect of introducing a benzyl, a beta-hydroxyethyl or a beta-aminoethyl group into the hexadecyltrimethylammonium bromide catalyst on the rate of alkaline hydrolysis of O-isobutyl-O'-n-nitrophenylmethylphosphonate was studied spectrophotometrically. The modified catalysts were found to be much more effective, particularly the latter two. The benzyl catalyst may

provide a "pseudobenzene" environment at the surface of the catalyst micele, facilitating interaction of the hydroxide of the ester due to partial reagent dehydration. Studies of reaction rate as a function of pH in the 9.0-9.9 range indicate that the anion of the beta-hydroxyethyl catalyst has approximately the same reactivity as hydroxyl ion. Since the ratio of rate constants in water and D_2O for this catalyst was 0.93, a direct nucleophilic mechanism is suggested. For the beta-aminoethyl catalyst the ratio was 2.13, corresponding to universal base catalysis by the free amino group in the micele phase. Figures 3; references 17: 6 Russian, 11 Western.
[5-12126]

UDC 541.636:547.1'118:547.879

CONFORMATIONAL EQUILIBRIUM OF N,N-DISUBSTITUTED 5-PHENYL-1,3,5-DIAZAPHOSPHORINANES AND THEIR DERIVATIVES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 17 Oct 80) pp 1539-1544

ARBUZOV, B. A., YERASTOV, O. A., NIKONOV, G. N., ZYABLIKOVA, T. A., YUFIT, D. S. and STRUCHKOV, Yu. T., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of USSR Academy of Sciences; Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The maximum and minimum values of the molar fraction of form (A) upon variation of the molar fractions of form (B) and (C) from zero to a value making physical sense were calculated from the equation which links the square of the experimental dipole moments to the squares of dipole moments and molar fractions of forms (A), (B) and (C). The results from two methods were compared to obtain information about the composition of equilibrium. The stability of form (B) in the systems under consideration confirm the data of X-ray diffraction analysis. Forms with an axial substitute on one of the heteroatoms and a form with all equatorial substitutes on phosphorus and nitrogen atoms can exist in conformational equilibrium of N,N-disubstituted 5-phenyl-1,3,5-diazaphosphorinanes, their oxides and sulfides. There was some underestimation of values calculated from KSSV models, compared to those of the dipole model, possibly caused by a systematic error of the methods and the effect of solvents. Figures 2; references 16: 8 Russian, 8 Western.
[132-6521]

UDC 541.636:542.91:547.1'118:547.879:547.1'127

PROPERTIES AND STRUCTURE OF INTERACTION PRODUCT OF DI(HYDROXYMETHYL)-PHENYLPHOSPHINE AND ISOBUTYL ESTER OF DIPHENYLBORIC ACID

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 24 Oct 80) pp 1545-1550

ARBUZOV, B. A., YERASTOV, O. A., NIKONOV, G. N., YESPENBETOV, A. A., YANOVSKIY, A. I. and STRUCHKOV, Yu. T., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of USSR Academy of Sciences; Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] An attempt was made to carry out reactions of hydroxymethyl derivatives of primary phosphines through exchange of the hydroxymethyl groups for alpha-oxyalkyl and alkyl groups in the reaction of di(hydroxymethyl)-phenylphosphine and the isobutyl ester of diphenylboric acid. Intermolecular hydrogen bonds in which the unordered hydroxy group O^1H participates as the donor and the atom of the oxygen cycle participates as the acceptor were found in the interaction of di(hydroxymethyl)phenylphosphine and the isobutyl ester of diphenylboric acid. A cyclic phosphorus-containing ester of diphenylboric acid with four-coordinated phosphorus and boron atoms and a hydroxymethyl group on the phosphorus atom is formed instead of the expected ester interchange product of diphenylborylhydroxymethyl(hydroxymethyl)phenylphosphine when di(hydroxymethyl)phenylphosphine reacts with the isobutyl ester of diphenylboric acid. Diphenylborylhydroxymethyl(hydroxymethyl)phenylphosphine derivatives are formed when di(hydroxymethyl)phenylphosphine reacts with sulfur, amines and MeONa. Figure 1; references 16: 9 Russian, 7 Western.
[132-6521]

UDC 542.91:547.1'118

o-PHOSPHORUS-SUBSTITUTED BENZOIC ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 14 Oct 80) pp 1596-1600

BONDARENKO, N. A., TSVETKOV, Ye. N., MATROSOV, Ye. I. and KABACHNIK, M. I., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The synthesis of some o-phosphorus-substituted benzoic acids was carried out to investigate the effect of the nature of the OH group on the nature of the H-bond in the crystalline state and in solutions. The initial compounds for o-phosphoryl-containing benzoic acids were o-phosphorus-substituted toluenes produced by interaction of o-toluene magnesium bromide and chloroanahydrides of dialkylphosphinic acids. o-Diphenylphosphoryltoluene was

synthesized from o-toluene magnesium bromide and Ph_2PCl with subsequent oxidation of the formed phosphine by hydrogen peroxide. The ionization constants were measured by potentiometric titration in aqueous alcohol and in water in the case of water-soluble acids at 25°C. References 18: 9 Russian, 9 Western.
[132-6521]

UDC 542.91:547.1'118

INTERACTION OF 2-PHENYL(ACETYL)-5-METHYLDIAZAPHOSPHOL AND PHENYLAZIDE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 8 Jul 80) pp 1600-1602

ARBUZOV, B. A., DIANOVA, E. N. and SHARIPOVA, S. M., Chemical Institute imeni A. M. Butlerov, Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The reactions of diazaphosphols and phenylazide were investigated to continue the study of cycloaddition by the P = C bond of a two-coordinated phosphorus atom. The interaction of 2-phenyl-(I) and 2-acetyl-5-methyldiazaphosphol with phenylazide was carried out both without a solvent and in an ester, pentane, C_6H_6 and CCl_4 and was accompanied by vigorous separation of nitrogen with formation of unstable amorphous adducts in the ratio of 1:1. The infrared spectra of the atoms were compared to spectra of the initial diazaphosphols, which showed that the diazaphosphol cycle was retained in the atoms. Trimers are formed upon interaction of 2-phenyl(acetyl)-5-methyldiazaphosphols and phenylazide which form 2-phenyl(acetyl)-3-oxo-3-aniline-5-methyldiazaphospholines-1,2,3 when they are hydrolyzed. References 7: 5 Russian, 2 Western.
[132-6521]

UDC 541.571.9:547.1'118

HYDROGEN BOND IN o-PHOSPHORUS-SUBSTITUTED BENZOIC ACIDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 14 Oct 80) pp 1628-1631

MATROSOV, Ye. I., BONDARDENKO, N. A., TSVETKOV, Ye. N. and KABACHNIK, M. I., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The infrared spectra of o-phosphorus-substituted benzoic acids and their methyl esters were investigated to study the formation of an intramolecular hydrogen bond. The infrared spectra of o-phosphorus-substituted benzoic acids in the crystalline state have broad intensive absorption in the OH vibrational region that alters its structure when the substitutes are replaced

in the phosphorus atom. Strong hydrogen bonds are formed in o-phosphorylbenzoic acids in the solid phase with the participation of carboxyl and phosphoryl groups. There are no intermolecular contacts between individual chains of the molecules in the crystalline state. The o-phosphorylbenzoic acids are present in solutions in $CHCl_3$ in the form of monomeric molecules in which the COOH and P = O groups are bound by a strong intramolecular hydrogen bond. The hydrogen bonds are similar to or even higher than the binding energy of intramolecular hydrogen bonds. Figures 2; references 10: 5 Russian, 5 Western.
[132-6521]

UDC 542.91:547.386:547.399

REACTIONS OF 1,2-DITHIOLAN- AND 1,2-DITHIOLEN-3-ONES WITH PHOSPHENES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 29 Oct 80) pp 1633-1636

VASIL'YEVA, T. P., BYSTROVA, V. M., LIN'KOVA, M. G., KIL'DISHEVA, O. V. and KNUNYANTS, I. L., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Reactions of unsaturated 1,2-dithiolen-3-ones were studied to determine whether they lose a sulfur atom in position 1 due to the effect of triphenylphosphine. The sulfur atom in the given reactions was attacked by phosphines in position 2 and an unstable ketene containing a thioketo group was formed. The attack of the sulfur atom in position 2 by phosphenes yields reaction-capable thioacylketenes. The reaction of 1,2-dithiolan-3-ones and phosphenes under similar conditions form β-thiolactones as a result of the sulfur atom being attacked in position 1 by the phosphenes. A new method was found to produce esters of β-mercapto-α, β-unsaturated acids by reaction of 1,2-dithiolen-3-ones and phosphenes in the presence of alcohol. References 7: 2 Russian, 5 Western.
[132-6521]

UDC 542.943:547.1'118'161

OXIDATION OF BIS(α,α, ω-TRIHYDROPERFLUOROALKYL)- AND TRIS(α,α,ω-TRIHYDROPERFLUOROALKYL)PHOSPHITES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 4 Nov 80) pp 1641-1643

FOKIN, A. V., STUDNEV, Yu. N., RAPKIN, A. I., PASEVINA, K. I. and KOLOMIYETS, A. F., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Nitrogen tetraoxide of bis(α,α,ω-trihydroperfluoroalkyl)phosphites was oxidized to the corresponding acid phosphates. Bis(α,α,ω-trihydroperfluoroalkyl)phosphites are less active in the oxidation reaction of nitrogen tetroxide

than the corresponding complete esters of phosphorous acid. Previously unknown bis (1,1,5-trihydroperfluoroamyl)phosphite was synthesized and the substitution of acetic acid for trifluoroacetic acid did not influence the conditions of the given process. The possibility of oxidation of bis(α,α,ω-trihydroperfluoroalkyl)- and tris(α,α,ω-trihydroperfluoroalkyl)phosphites by oxygen is shown during catalysis of nitrogen tetraoxide. References 7: 4 Russian, 3 Western.
[132-6521]

UDC 542.91:547.1'118:547.446

INTERACTION OF α,α,ω-TRIHYDROPERFLUOROALKYL ESTERS OF PHOSPHOROUS ACID WITH POLYFLUOROCARBONYL COMPOUNDS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 7, Jul 81 (manuscript received 23 Dec 80) pp 1655-1658

FOKIN, A. V., STUDNEV, Yu. N., RAPKIN, A. I., PASEVINA, K. I., VERENIKIN, O. V. and KOLOMIYETS, A. F., Institute of Elementary Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] The interaction of bis- and tris(α,α,ω-trihydroperfluoroalkyl)-phosphites with polyfluorocarbonyl compounds was studied to determine the nucleophilic and electrophilic nature of the phosphorus atom. Bis(1,1,3-trihydroperfluoropropyl)phosphite does not react with hexafluoroacetone at 20°C. An exothermic reaction which leads to the corresponding trialkylphosphate is observed upon catalysis of Et_3N. The α,α,ω-trihydroperfluoroalkyl esters of phosphorous acid show less reactivity upon reaction with polyfluorocarbonyl compounds. The interaction of tris(1,1,3-trihydroperfluoropropyl)-phosphite and hydrates of hexafluoroacetone and trifluoroacetaldehyde forms α-monohydroperfluoroisopropyl-bis(1,1,3-trihydroperfluoropropyl)phosphate and 2,2,2-trifluoroethyl-bis(1,1,3-trihydroperfluoropropyl)phosphate. References 8 (Russian).
[132-6521]

UDC 547.241

SYNTHESIS OF ALLYLPHOSPHONATES WITH AID OF INTERPHASE CATALYSIS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 34, No 10, Oct 81 (manuscript received 16 Jun 81) pp 889-890

KHACHATRYAN, R. A., SAYADYAN, S. V., TORGOMYAN, A. M. and INDZHIKYAN, M. G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] The possibility of the use of interphase catalysis for synthesis of allylphosphonates from dialkylphosphites and allylhalides was demonstrated

with the reaction being conducted in a liquid-solid system. Gas-liquid chromatography of the compounds obtained was performed on a "Svet" device and paramagnetic resonance spectra were produced by use of a R12B spectrometer. References 3 (Russian).
[50-2791]

UDC 541.49:547.359.8'131:547.1'118

COMPLEX FORMATION OF π-ALLYLPALLADIUM CHLORIDE WITH FERROCENYL PHOSPHINE LIGANDS AND STUDY OF HINDERED ROTATION AROUND Pd-P BOND

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 10, Oct 81 (manuscript received 9 Feb 81) pp 2228-2231

TOLKUNOVA, V. S., RUBEZHOV, A. Z., BAKHNUTOV, V. I. and VIL'CHEVSKAYA, V. D., Institute of Metal Organic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Addition products of bis-π-allylpalladium chloride with ferrocene containing phosphenes (I̲) were obtained and their PMR spectra were studied. The study compounds were obtained by splitting the halide bridges in the bis-π-allyl-μ-dichlorodipalladium with equimolar quantities of phosphine in THF at 20° under a stream of Ar. Activation parameters for the rotation around the Pd-P bonds were determined in several solvents. The solvents had little effect on these parameters with the exception of pyridine, in which the rotation rate increased sharply. This could be due to a reaction of pyridine with the Pd-Cl bond. Figures 2; references 12: 4 Russian, 8 Western.
[42-7813]

UDC 547.234.1 + 547.241 + 541.127

α-EFFECT IN REACTIONS OF PHOSPHORIC ACID HYDRAZIDES WITH ELECTROPHILIC REAGENTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81 (manuscript received 19 Jun 80) pp 2347-2352

YANCHUK, N. I., Ternopol' State Pedagogical Institute imeni Ya. A. Galan

[Abstract] The reactivity of organophosphoric hydrazines was investigated in reactions with phenylisocyanate, phenylisothiocyanate and picryl chloride. Quantitative evaluation of the α-effect of phosphorus-containing hydrazides, i.e., its increased reactivity, towards various electrophilic reagents was performed. This effect depends on the nature of the nucleophilic reagent and on the substrate; it depends on the reaction mechanism. Those reactions which go through formation of cyclic aromatic complexes are energetically more efficient and exhibit higher α-effect. This was especially evident when

phenylisocyanate reactions were compared with those of phenylisothiocyanate. A linear relationship was established for the hydrazide basicity constants and the σ_ϕ constants for the phosphorus atom substituents in reactions of phosphoric acid hydrazide with phenylisocyanate. The reactions of nucleophilic addition were more sensitive to the α-effect than those of nucleophilic substitution. References 19: 13 Russian, 6 Western.
[40-7813]

UDC 541.63:547.111'8:543.51

SYNTHESIS AND MASS-SPECTRA OF 2,2,5-TRIORGANYL-5-THIONO-1,3-DIOXA-2-SILA-5-PHOSPHORINANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 29 Jan 81) pp 2176-2178

VORONKOV, M. G., VITKOVSKIY, V. Yu., KUDYAKOV, N. M. and VALETDINOV, R. K., Irkutsk Institute of Organic Chemistry, Siberian Branch, USSR Academy of Sciences

[Abstract] Title compounds were obtained by reacting elementary sulfur with corresponding 2,2,5-triorganyl-1,3-dioxa-2-sila-5-phosphorinanes. Four derivatives were obtained (alkyl substituent at P atom and its m.p. in °C indicated): CH_3, 93-95; C_2H_5, 85-87; iso-C_3H_7, 111-112; and C_6H_5, 80-81. IR and mass spectral characteristics are reported for each compound. During the dissociation of molecular ions, two CH_2O groups were split off, followed by the P=S radical. With increasing size of the alkyl substituent at the P atom the C-P bond became weaker, favoring the separation of the C_nH_{2n} fragment rather than the CH_2O group. Reference 1 (Russian).
[40-7813]

UDC 541.6:547.241:547.245

STRUCTURE AND DONOR ACTIVITY OF METAL ORGANIC COMPOUNDS, COMMUNICATION 19: ROTATIONAL ISOMERISM OF O,O-DIALKYL-O-TRIMETHYLSILYLTHIOPHOSPHATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 26 Jan 81) pp 2179-2183

LAPIN, I. A., KOLODYAZHNYY, Yu. V., TSAPKOVA, N. N., BUGERENKO, Ye. F. and OSIPOV, O. A., Rostov State University

[Abstract] Stereochemical investigation of $(RO)_2P(S)OSi(CH_3)_3$ compounds, where R = CH_3, C_2H_5 and C_3H_7, was carried out by determining their IR spectra, dipole moments and Kerr effects. These compounds could exist in 12 different steric configurations. On the basis of experimental data, it was concluded

that 0,0-dimethyl-0-trimethylsilylthiophosphates exist in an equilibrium of cis-gosh$_1$-gosh$_2 \rightleftarrows$cis-cis-gosh$_1$ conformations, with $X_A = 0.84$ and $X_B = 0.16$ respectively. The equilibrium is shifted towards the A form with increasing chain length; the dipropyl derivative has only the A form in a stable state. Cis orientation of the phosphoryl and the $(CH_3)_3SiO$ groups is due primarily to dipole-dipole interactions and to the conjugation effect; it is not due to the steric effect. Substituting sulfur for the oxygen at the phosphorus atom had practically no effect on the conformational equilibrium in $(RO)_2P(X)OSi(CH_3)_3$ type compounds ($X = O, S$; $R = CH_3, C_2H_5, C_3H_7$). Figures 3; references 52: 49 Russian, 3 Western.
[40-7813]

UDC 541.636 + 547.241

MUTUAL INTERACTIONS AMONG GROUPS IN PHOSPHAZOSULFONYL MOLECULES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 9 Dec 80) pp 2184-2189

KOZLOV, E. S., KHMARUK, A. M. and DYADYUSHA, G. G., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Phosphazosulfonyl compounds $X_3P{=}NSO_2Y$ have been widely used in studies of the spectral characteristics of nitrogen-phosphorus bonds. In the past, it was believed that the vibrations of this bond interact poorly with the vibrations of the neighboring S-N bond and that the $\gamma(P{=}N)$ frequency was quite characteristic. The aim of the present study was to shed more light on this question. The mutual effect of phosphazo- and sulfonyl groups in the phosphazosulfonyl molecules was manifested by a lowered frequency of the valence vibrations of SO_2 group and by considerable drop in the force constant of the P=N bond. The kinetic interaction of P=N vibrations with the vibrations of the neighboring S-N bond was intensified. Changes in the electronegativity and in the geometry of phosphorus atom substituents showed some effect on the SO_2 group frequency, but not as strong an effect as that exhibited on the PNS frequencies. References 27: 14 Russian, 13 Western.
[40-7813]

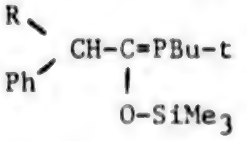
UDC 547.241

PROTOTROPIC REARRANGEMENT IN $-\mathrm{P^{III}}{-}\overset{|}{\mathrm{C}}{-}\mathrm{C}<$ TRIADE: KETENE REACTION WITH SILYLATED PHOSPHINES

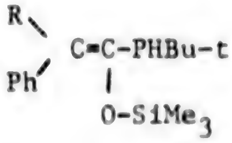
Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 12 Mar 81) pp 2189-2194

KOLODYAZHNYY, O. I. and KUKHAR', V. P., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] The goal of this study was to investigate prototropic mobility in the $-\mathrm{P^{III}}{-}\overset{|}{\mathrm{C}}{-}\mathrm{C}<$ triade which could involve the isomeric form of dicoordinated phosphorus $-\mathrm{P{=}\underset{|}{C}{-}\underset{H}{\underset{|}{C}}{-}} \rightleftarrows -\mathrm{\underset{H}{\underset{|}{P}}{-}\underset{|}{C}{=}\underset{|}{C}{-}}$. Two sets of isomers were synthesized for this purpose:



$\mathrm{\overset{R\diagdown}{\underset{Ph\diagup}{}}CH{-}\underset{\underset{O{-}SiMe_3}{|}}{C}{=}PBu{-}t}$ (I and II) and



$\mathrm{\overset{R\diagdown}{\underset{Ph\diagup}{}}C{=}\underset{\underset{O{-}SiMe_3}{|}}{C}{-}PHBu{-}t}$ (III, IV),

where R = Ph (for I and III) and R = $\mathrm{MeO_2C}$ (for II and IV). The I and III compounds were found to be stable isomers which did not rearrange even on heating or in presence of triethylamine. This stability of I and III indicated a high energy barrier for a prototropic rearrangement in the triade $-\mathrm{P}{-}\overset{|}{\mathrm{C}}{-}\mathrm{C}<$. This barrier could be lowered by introduction of an electron-accepting substituent into the triade. The other set of isomers (II and IV) were also stable at 20°C, but at 120-140°C II converted to IV. The rearrangement was complete and irreversible. To shed more light on the reaction of silylated phosphines with ketenes, diphenylketene was reacted with a series of phosphines. The reaction occurred along the C=O bond yielding C-phosphorylated, O-silylated vinylphosphines. References 9: 1 Russian, 8 Western.
[40-7813]

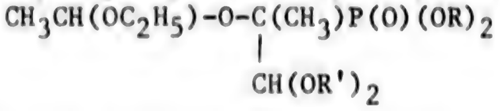
UDC 547.26'118 + 547.421/4/5

ADDITION OF DIALKYLPHOSPHOROUS ACIDS TO KETOACETALS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 12 Dec 80) pp 2198-2202

GAZIZOV, M. B., KHAYRULLIN, R. A. and RAZUMOV, A. I., Kazan' Chemical-Technological Institute imeni S. M. Kirov

[Abstract] It was shown that dialkylphosphorous acids add to ketoacetals under conditions of V. S. Abramov's reaction (i.e. in presence of sodium alkoxide) to yield phosphorylated α-hydroxyacetals. During distillation these products revert back to the starting materials. Their formation was

proven by the IR and NMR spectra taken on a crude product and by the formation of 2,4-dinitrophenylhydrazones. Reacting these phosphorylated α-hydroxy acetals with vinylethyl ether led to the formation of  $CH_3CH(OC_2H_5)-O-\underset{\displaystyle CH(OR')_2}{\underset{|}{C}}(CH_3)P(O)(OR)_2$ in 50% yield. However, these products could not be isolated in pure state; their structure was supported by PMR data. When levulinic aldehyde was reacted with dialkylphosphorous acids in presence of sodium alkoxide, the products were 2-methyl-2-dialkylphosphone-5-ethoxytetrahydrofuranes. References 2: 1 Russian, 1 Western.
[40-7813]

UDC 547.341

REACTIONS OF BIS(TRIMETHYLSILYL)HYPOPHOSPHITE WITH PHOSPHORYLATED ALLENES AND ACETYLENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81 (manuscript received 22 Dec 80) pp 2202-2206

KHUSAINOVA, N. G., ROMANOV, G. V., NAZMUTDINOV, R. Ya. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The exothermic reaction of bis(trimethylsilyl)hypophosphite (I) with diethyl ester of γ,γ-dimethylallenylphosphonic acid (II) yields 1-diethylphosphone-2-bis(trimethylsiloxy)phosphino-3-methyl-2-butent. The dimethyl ester of II reacts analogously with I. The reaction of I with diethyl ester of allenylphosphonic acid is also exothermic, yielding only 1-diethylphosphone-2-bis(trimethylsiloxy)phosphino-2-propene. In contrast to these energetic reactions, bis(trimethylsilyl)hypophosphite reacts slowly with propynylphosphonates (several weeks at room temperature, 2-3 hrs at 100°C), to yield 1-diethylphosphone-2-bis(trimethylsiloxy)phosphino-1-propene. References 6: 5 Russian, 1 Western.
[40-7813]

UDC 547.341 + 541.67

APICOPHILICITY OF EXOCYCLIC GROUP AND STRUCTURE OF 2,2-DIOXAPHOSPHOLANE-1,2-OXAPHOSPHOL-4-ENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 29 Sep 80) pp 2206-2213

RAGULIN, V. V., ZAKHAROV, V. I. and RAZUMOVA, N. A. (deceased), Leningrad Technical Institute imeni Lensovet

[Abstract] The effect of apicophilicity, the ability to orient itself in the axial position of a trigonal-bipyramide structure, of an exocyclic substituent on the structure and formation of 2,2-dioxaphospholane-2-alkoxy-3-phenyl-4-acetyl-5-methyl-1,2-oxaphosphol-4-enes was investigated by means of NMR. In general, apicophilicity depends on three factors: electronegativity, presence of an unshared electron pair and the availability of a vacant orbital at the heteroatom bound to the phosphorus. In the series studied, the following order of apicophilicity was noted: OAlk < OPh < OC_6F_6. This indicates that during nucleophilic substitution at the tetracoordinated phosphorus atom the pentacoordinated intermediate compound with a phenoxy group will show greater permutational lability than the one with an alkoxy group. The process of regular permutational isomerization in the compounds studied occurred along the route of trigonal twist, through the D_{3h}-symmetry intermediate, with the diequatorially-positioned dioxaphospholane ring and an axial exocyclic group. In such a case the activation barrier of this process should be lowered with increasing apicophilicity of the exocyclic group. Figures 2; references 13: 3 Russian, 10 Western.
[40-7813]

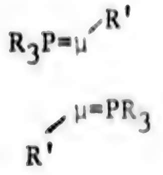
UDC 547.556.3

SELF-ASSOCIATION OF PHOSPHAZO COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 25 Nov 80) pp 2213-2215

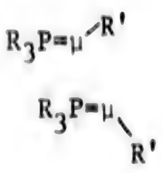
TSYMBAL, I. F. and BOROVIKOV, Yu. Ya., Institute of Organic Chemistry, UkSSR Academy of Sciences

[Abstract] Phosphazo hydrocarbons with acceptor substituents at the phosphorus atom tend to dimerize. It seemed plausible that, prior to the formation of a tetracyclic compound, a quasi addition product could be formed with anti-parallel molecular dipole orientation:



(I)

or



(II)

To verify this hypothesis, spectroscopic and dielectrometric studies were carried out of the solutions of triphenylphosphazohydride and triphenylphosphazophenyl. It was concluded that the triphenylphosphazo compounds are capable of dimerization (self-association) in CCl_4 solutions. The dipole orientation in the associated molecules does not appear to be antiparallel, favoring structure II. Figure 1; references 3 (Russian).
[40-7813]

UDC 547.241

REACTION OF PERFLUOROIODOALKANES WITH TRIVALENT PHOSPHORUS ACID ESTERS, COMMUNICATION 5: INVESTIGATION OF KINETICS AND REACTION MECHANISM OF 1-IODOHEPTAFLUOROPROPANE WITH ETHYLPHOSPHONITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 26 Dec 80) pp 2215-2222

GARABADZHIU, A. V., IVANOV, S. A., LAVRENT'YEV, A. N. and SHIBAYEV, V. I.,
Leningrad Technological Institute imeni Lensovet

[Abstract] The reaction of 1-iodoheptafluoropropane with ethylphosphonites was studied; the effect of substituents on the reaction rate was investigated in the temperature range of 360-420°K. This range was chosen because of a very low reaction rate below 360°K and considerable complications by side reactions above 420°K. The reaction exhibited characteristically low values of the energy of activation. The reaction was found to be independent of radical inhibitors or promoters. Literature data are not unanimous on the question of which of the two stages of Arbuzov's rearrangement is the limiting one. In this case it was established that the limiting phase is the one of intermediate complex formation. On the basis of experimental data it was concluded that donor-acceptor complexes participate in the reactions of perfluoroalkyl iodides with trivalent phosphorus acid esters. Depending on the reaction conditions, the medium, structure of the reagents, the complex forming at the first stage of the reaction may rearrange by an ion-radical, an ionic or a molecular mechanism. Figures 3; references 20: 16 Russian, 4 Western.
[40-7813]

UDC 547.558.1:547.8

PHENOPHOSPHAZINES, COMMUNICATION 5: 7,12-DIHYDROBENZO[α]PHENOPHOSPHAZINES

Leningrad ZHURNAL OBSHCEHY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 2 Dec 80) pp 2222-2227

ROZANEL'SKAYA, N. A., BOKANOV, A. I., NEGREBETSKIY, V. V. and STEPANOV, B. I., Moscow Chemical-Technological Institute imeni D. I. Mendeleyev; All-Union Scientific Research Institute of Chemical Plant Protective Agents

[Abstract] A series of 12-thiono-7,12-dihydrobenzo[α]phenophosphazines was synthesized. A solution of 0.1 mole of N-phenyl-2-naphthylamine and 0.1 mole phosphorus thiochloroxide in 70 ml o-dichlorobenzene was heated for 10 hrs at 175-176°C. After cooling, 12-chloro-12-thiono-7,12-dihydrobenzo[α]phenophosphazine precipitated out in 30% yield, m.p. 276-278°C. X-ray structural analysis showed that the central heterocycle was not flat. It took the boat form and the P-R bond was in an axial position. NMR data showed that the molecules of these compounds are chiral--they show not plane symmetry. References 6: 4 Russian, 2 Western.
[40-7813]

UDC 543.847

SYNTHESIS AND PROPERTIES OF ARYLARSONIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81
(manuscript received 10 Dec 80) pp 2232-2241

YAMBUSHEV, F. D., KOVYRZINA, V. P., SHAGIDULLIN, R. R., GORCHAKOVA, L. A., FEDOTOV, B. G., BESPALOV, Yu. A., NIKIFOROV, M. D., KOKOREV, G. I. and KHALITOV, F. G., Kazan' State Pedagogical Institute, Scientific Production Association; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] A series of arylarsonium acids was synthesized by the Bart method, where aqueous aryldiazonium chlorides and sulfates were slowly added to a solution of sodium arsenite. Purification of these products was achieved by treatment with activated charcoal, followed by washing with alcohol, acetone and ethylacetate. A series of X-$C_6H_4AsO(OH)_2$ was obtained, where X = o-, m-, and p-H, CH_3, CH_3-O, Cl, Br, I and NO_2. Two endothermal effects were noted on the DTA curve. The first stage of thermal conversion concerns breaking the hydrogen bonds with which arylarsonic acids from oligomeric chains. The second peak evidently represents removal of water molecule from the acid. Strong hydrogen bonding in arylarsonic acids was also indicated by the IR spectra. On the basis of IR data, all of these compounds could be divided into two groups: one with a

strong C band and the other with a weak C band. The strong C band group includes compounds in which the oxygen atom of the As=O participates in hydrogen bonding, leading to long chains. In the other group cyclic dimers predominate connected by the H-bonds. Figure 1; references 31: 8 Russian, 23 Western.
[40-7813]

PETROLEUM PROCESSING TECHNOLOGY

UDC 665.658.2.002.3

REDUCTION OF COKE FORMATION IN HYDROFINING EQUIPMENT OF REFORMING UNITS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81
pp 9-10

YERMAKOV, Ye. A. and SIDOROV, I. Ye., Industrial Association
"Angarsknefteorgsintez"

[Abstract] Coke deposits in heat exchangers and tube furnaces in the preliminary hydrofining unit are negative aspects of gasoline hydrofining. Experience gained during 2 years of use of an L-35-11 catalytic reforming unit by the industrial association "Angarsknefteorgsintez" in reducing coke deposits is discussed. Feed was passed directly through three tanks ahead of the hydrofining unit. Gasoline color was monitored continuously. To prevent contact with air, gasoline in tanks was covered with pontoons consisting of a polyamide mat with foam-plastic floats. The feed was the fraction with the initial boiling point of 80-90°C and end point of 175-180°C. Compressors also operated on a circulating regime. These changes did not affect pressure in the hydrofining system, but did increase the temperature of the gas product mixture at the heat-exchanger outlet. There were almost no coke deposits in and between pipes. Testing of various heat exchangers showed that heat exchangers (L-35-11) in the preliminary hydrofining unit at the Angarsk oil refinery had the least coke deposits.
[24-9307]

UDC 665.733.035.001.4

CHARACTERISTICS OF B-95/130 AND B-100/130 GASOLINES WITH CATALYTICALLY REFORMED COMPONENT

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81 pp 17-20

DEMIDENKO, K. A., DOLBANOVA, T. A., YEMEL'YANOV, V. Ye. and ENGLIN, B. A., All-Union Scientific Research Institute of the Petroleum Industry

[Abstract] Results are presented from determinations of component composition and rating evaluation of the two gasolines, which were obtained at two refineries from reformed gasoline, met the requirements of GOST [State Standard] 1012-72, and had a high octane number. Their service properties were similar to aviation gasoline from other refineries.
[24-9307]

UDC 662.753.1+662.61.1+622.69

CHANGES IN ANTIKNOCK VALUE OF GASOLINES DURING UNDERGROUND STORAGE

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81 pp 20-21

AZEV, V. S., KUZNETSOVA, L. N. and MALYKHIN, V. D.

[Abstract] Changes were determined in the antiknock values of automotive fuel during laboratory storage in contact with rock salt, liquor and Cambrian clay at 18-22°C and surface-to-volume ratio of 400 m^{-1}. The octane number of nonethylated fuels decreased, depending on their chemical stability, from 2 to 11 units after 18-20 months of storage; this was related to the accelerated accumulation of hydroperoxides. Storage in rock-salt chambers did not affect the octane number of ethylated gasolines. The antiknock value of nonethylated gasolines should therefore be monitored regularly during underground storage. Figures 3; references 4: 3 Russian, 1 Western.
[24-9307]

UDC 621.43.018.2:621.892.096.1

EFFECT OF HIGH-TEMPERATURE ANTIFRICTION ADDITIVES ON ANTIWEAR PROPERTIES OF MOTOR OIL

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81
pp 25-27

LASHKHI, V. L., VIPPER, A. B., MIKUTENOK, Yu. A. and KULAGIN, V. V.

[Abstract] The effect of the high-temperature antifriction additives: low-solubility molybdenum compound, experimental antiwear additives A and B, and a colloid dispersion of molybdenum disulfide, on the antiwear properties of M-10V$_2$ oil was studied on a 2CH 10.5/13 engine under test conditions. All additives improved oil antiwear properties. The tendency of motor oil to form carbon deposits decreased in the presence of the molybdenum compounds. The antifriction additives slightly decreased the accumulation of insoluble products and reduced oil loss by 30-35%. The action of antifriction additives was studied by ferrography, derivatography in the presence and absence of powdered iron, and differential thermal analysis. The mechanism of action of the low-solubility molybdenum compound was based on its reaction with the metal of the rubbing surface at high temperatures. Figure 1; references 12: 4 Russian, 8 Western.
[24-9307]

UDC 665.61.03

EXPANSION AND IMPROVEMENT OF PETROLEUM ANALYSIS PROGRAMS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81
pp 30-35

DRIATSKAYA, Z. V., MKHCHIYAN, M. A., MANOVYAN, A. K., IVCHENKO, Ye. G., ZHMYKHOVA, N. M. and BATYANOVA, T. F., All-Union Scientific Research Institute of the Petroleum Industry, Groznenskiy Scientific Petroleum Research Institute and Bashkir Scientific Research Institute of Petroleum Refining

[Abstract] Three standardized programs for petroleum analysis, proposed at the IV All-Union Conference and accepted by the Ministry of Petroleum Refining and Petrochemical Industry, are described. These programs are mandatory for all institutes involved in petroleum analysis. The basic program applies to analyzing petroleum from major new fields or horizons or petroleum with a unique composition; the first concise program applies to analyzing petroleum from new low-yield fields or to control tests for petroleum from old fields, and the second concise program to analyzing petroleum from wildcats. State standards and procedures for determining each oil quality index are listed. Results of the petroleum analyses are to be filed in the All-Union Petroleum File at the All-Union Scientific Research Institute of the Petroleum Industry.

Plans for publishing the data of petroleum analyses completed in the last 10 years are also discussed. Figures 3; references 10: 1 Polish, 7 Russian, 2 Western.
[24-9307]

UDC 665.6-404:543.87.034

ANALYSIS OF OXIDATION STABILITY OF OILS UNDER PRESSURE

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 10, Oct 81 pp 44-46

POGORELOV, Ye. S. and GUREYEV, A. A., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] Since lubricating oil is oxidized at various pressures under operating conditions, a device (TSD-1) with a new stainless steel evaporator was developed to study the effect of pressure on oil oxidation stability. Oxidation stability of distillate, mixed and residual oils was assessed according to volatility, lacquer deposition and the amount of working fraction. An increase in gauge pressure from 0 to 0.2 MPa had the greatest effect on oil oxidation stability; the temperature maximum of lacquer deposition also shifted to lower temperatures at a higher pressure. Lacquer formed more actively in the oil layer directly adjacent to the metal surface. The TSD-1 device was also used to evaluate antisludge properties of various additives. The operating conditions of the TSD-1 device should be adjusted for each type of oil with regard to its use and purpose of the test. Figures 5; references 3 (Russian).
[24-9307]

UDC 665.753.4(083.74);658.62.018;006.82

UNIFORM STANDARD FOR HIGH-OCTANE DIESEL FUEL

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, Jan 81 pp 5-8

GUREYEV, A. A., Moscow Institute of the Petrochemical and Gas Industry imeni I. M. Gubkin

[Abstract] Two standards are presently being used to grade diesel fuel: GOST 4749-73 and GOST 305-73 for diesels from low-sulfur and from high-sulfur stocks, respectively. The need for two standards no exists as current technology allows the preparation of similar diesel fuels from oils having a wide range of sulfur contents. A new, unified standard recognizes three grades of diesel. Grade 1 is obtained only by the direct distillation of either low-sulfur oils or sour crudes after hydropurification and deparaffinization. This fuel has a cetane rating of greater than 50 and a flash point

in a closed crucible of greater than 90°C. Grade 2 diesel is derived from secondary processing. A maximum distillation cut-off point is not fixed but 90% of the fuel must boil below 360°C. The cetane number must be greater than 40 and the sulfur content, less than 0.5%. Grade 3 diesel is composed of the 80-360°C range of hydrocarbons obtained from primary and secondary processing of refabricated fuel. The cetane number must be greater than 35 and the sulfur content less than 1.0%. Uses and a complete outline of characteristics of each of the three grades are listed.
[78-12027]

UDC 547.424.3;547.057;542.973

PREPARATION OF NEOPENTYLENEGLYCOL IN PRESENCE OF TRIETHYLAMINE

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, Jan 81 pp 27-29

VYSOTSKIY, M. P., KETSLAKH, M. M., RATANOVA, A. I. and ROYTMAN, B. M.,
All-Union Scientific Research Institute of Petrochemical Processes

[Abstract] The two-stage process for preparing neopentylglycol (NPG) requires aldol condensation of isobutylaldehyde and formaldehyde to form pentaldol and subsequent hydrogenation of the latter to neopentylglycol. Triethylamine, either with or without the additions of small amounts of base, acts as a catalyst. The study involves measuring the effects of changes in the process parameters, such as temperature and reactant concentrations, on the rate of production and total yield of the products. The optimal conditions are as follows: for step 1 (condensation), the molecular ratio of isobutyl aldehyde to formaldehyde, 2:1; catalyst, 0.062 moles of triethylamine per mole CH_2O; NaOH, 0.01 mole per mole CH_2O; temperature, 75°C; for step 2 (hydrogenation), temperature, 120-140°C, hydrogen pressure, 5.0 MPa; rate of hydrogen circulation, 600-1200 vol/vol catalyst per hour; and rate of supply of the products, 1 vol/vol catalyst per hour. Analytical procedures are briefly described. Figure 1.
[78-12027]

UDC 542.952;547.217.3/.218.3

REACTIVITY OF N-ALKANES C-9 TO C-18 TOWARDS HYDROISOMERIZATION OVER ALUMINOPALLADIUM-SULFUR CATALYST

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, Jan 81 pp 29-31

ARIFULIN, A. S., BOL'EPSHTEYN, A. B. and YULIN, M. K., Institute of Fossil Fuels

[Abstract] The title study was carried out by measuring the molar reaction rates of C-9, C-10, C-12, C-16, and C-18. The alkanes were added at the rate ,

of 5 mol/l·hr and at a molar ratio of alkane:hydrogen of 1:7. Temperature was 400°C. The degree of isomerization does not change significantly with molecular weight, ranging around 50% of the reactant; however, the ratio of dimethyl to monomethyl isomers in the product mix increases from C-9 to C-12, remains the same for C-16 then decreases for C-18. The yield of total gaseous and aromatic products increases with molecular weight. The relative composition of the gases is 6.5 to 10% methane, 7.0 to 13% ethane (increasing with increasing molecular weight), 29 6 to 33.4% propane, 17.4 to 33.4% isobutane (decreasing with increasing molecular weight), and 16.7 to 30.4% normal butane. About 30 to 50% of the original n-alkane material (decreasing with increasing molecular weight) was recovered. Experiments where only the rate of addition of the hydrocarbon was varied confirm a small dependence of the degree of isomerization and the nature of the products on the molecular weight of the reactant alkane. Figure 1.
[78-12027]

UDC 665.637.567;665.613.22

EFFICIENT METHOD FOR VARIABLE REPROCESSING OF PARAFFINIC AND HIGHLY PARAFFINIC FEEDSTOCKS

Moscow NEFTEPERERABOTKA I NEFTEKHIMIYA in Russian No 1, Jan 81 pp 8-10

ODINTSOV, O. K., PEREVERZEV, A. N. and BROVARSKAYA, S. S., Groznyy Petroleum Scientific Research Institute

[Abstract] Different procedures for reprocessing are necessary to obtain the maximum yields of desirable products and minimize the refining costs for feedstocks having significant concentrations of high molecular weight paraffins. A detailed processing scheme is given for each of two reprocesses oils: a Belorussian type containing 25-26 weight % n-paraffins in the kerosene-diesel fractions and a Romashkin crude from the "Druzhba" pipeline containing 13-15 weight % n-paraffins in the same fraction. The deparaffining process for the feedstocks must be stable and variable in response to the concentration of paraffins in the crude, an acceptable reactive fuel, complying with thermal stability requirements, was obtained in an 8% by volume yield and had an initial crystallization temperature of -55°C and an aromatic content of 19 weight %; an acceptable fuel oil, complying with appropriate technical standards, was obtained by mixing the diesel fraction and fuel oil (in a 2:3 ratio) after the atmospheric distillation of the oil mixture from the "Druzhba" pipeline. Figure 1.
[78-12027]

PETROLEUM REFINING AND PETROCHEMICAL INDUSTRY DURING 11TH FIVE-YEAR PLAN

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 2, Feb 81 pp 3-7

FEDOROV, V. S., minister of petroleum refining and petrochemical industry,
hero of socialist labor

[Abstract] Important considerations for the period 1981-1985 and to the year 1990 are the efficient utilization of raw materials and capital, and the acceleration of technological progress, specifically improving the fuel-energy balance of the country; establishing a key position in the industry for olefins, aromatics, and naphthenic hydrocarbons; improving synthetic rubbers, tires, and resin and asbestos industrial products; and developing products for the manufacture of chemical fibers, plastics, and synthetic detergents. The major achievements of the 10th Five-Year Plan (1976-1980) are briefly reviewed to set the stage for the new plan. Efficiency and, also, technical progress depend on developing products with new chemical structures and new properties plus developing advanced refining techniques based on improved catalytic and hydrocracking, hydropurification, alkylation and catalytic reforming, specifically for high-octane gasoline and important synthetic raw materials such as olefine, α-olefins, dienes, ethylbenzene, styrene, ethylene oxide and alkylphenols. A specific goal is the production of a synthetic lube oil having a high thermal stability and excellent friction-reducing properties.
[77-12027]

ACCOMPLISHING GOALS AND SOCIALIST OBJECTIVES DURING 10TH FIVE-YEAR PLAN AT ALL-UNION SCIENTIFIC RESEARCH AND PROJECT-PLANNING INSTITUTE OF THE PETROLEUM REFINING AND PETROCHEMICAL INDUSTRY

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 2, Feb 81 pp 9-10

CHEREDNICHENKO, G. I.

[Abstract] General accomplishments have included creation of a basic group of domestic resin materials to satisfy consumer and industrial requirements. The number of products increased by 1.5 times. More than 70% of the introduced developments were new inventions. Important advancements were made in the development of sulfonate additives for the Novopolotsk NPZ [TN: petroleum refining plant?]; of a complex thermal desalination process which operates in a closed-loop system for the Lisichansk NPZ; of an ethylene pipeline transport system in Nizhnekamsk-Ufa-Sterlitamak-Salavat. Technology was developed for manufacturing a dialkyldithiophosphate additive, and for regulating plants producing the following products: monoalkylphenol for non-ionic surfactants, 100,000 t/yr; sulfonate additive, S-150, 30,000 t/yr; alkylsalicylate additive MIKS, 4000 t/yr; and others. Both the number of projects and the number of staff at the institute increased during this period.
[77-12027]

UDC 621.892.211;66.094.38

WEARING PROPERTIES OF ANTIOXIDANT ADDITIVES IN AVIATION FUELS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 2, Feb 81
pp 32-34

MIKHEICHEV, P. A. and IONOVA, L. L., GosNII (State Scientific Research Institute)
ERAT GA

[Abstract] The title study was carried out by monitoring the changes in acid number, kinematic viscosity, amount of sediment, and the formation of oxygen-containing components in four additives oxidized at temperatures from 150°C to 200°C for 20 to 180 min in the presence of copper, steel, or aluminum-alloy catalyst. The four additives and their respective optimum operating temperatures are SM-4,5p(<150°C); MS-8p (<175°C); MN-7,5U (<175°C); and IMP-10 (<175°C). At 150°C, the properties deteriorate sharply after 50 hours of oxidation for oils containing SM4,5p and after 170 hours for those with IMP-10. At 175°C, the respective times are 40 and 90 hours respectively; and at 200°C, 5 and 15 hours. With the exception of the viscosity, the oil properties seem to be a direct function of the remaining concentration of the additive. These additives retain the bulk of their wear-reducing properties to a residual concentration of 0.1 to 0.05%. Figure 1; references 3 (Russian).
[77-12027]

UDC 662.753.019.26

TENDENCY OF AROMATIC HYDROCARBONS IN REACTIVE FUELS TOWARDS OXIDATION

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 2, Feb 81 pp 34-36

CHERTKOV, Ya. B., GORENKOV, A. F., KIRSANOVA, T. I. and BEREZINA, R. M.

[Abstract] The title evaluation was made for 77 mixtures prepared by combining, in varying proportions, the paraffinic-naphthenic and aromatic fractions separated from five different fuels, and containing 5 to 28% aromatics. Four individual alkylbenzenes are also evaluated. The oxidation was carried out using air and potassium permanganate at room temperature, 100°C and 150°C from 1 1/2 to 7 hours in the presence of copper. The results are expressed as equivalent milliliters (EM's) of 0.1N $KMnO_4$ at room temperature and towards air at 100°C or below (EM = 2 to 28). The aromatic fraction is strongly oxidized (EM = 68 to 180) by both oxidizers at 25°C. For the individual alkylbenzenes, compounds having the alkyl sidechain attached to the ring by a secondary carbon atom are more stable towards oxidation than those having a group attached by a tertiary carbon. Thus the paraffinic (akkyl) moiety of the aromatic fraction exerts a significant influence on the oxidation of such compounds. No separate phase was observed during the oxidation of the mixtures by air at 100°C or 150°C. References 10 (Russian).
[77-12027]

UDC 615.218.3:547.341

ANTIALLERGIC PROPERTIES OF SOME ALKYLATING ORGANOPHOSPHORUS COMPOUNDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 15, No 9, Sep 81
(manuscript received 4 Feb 81) pp 34-38

TOMILETS, V. A., DONTSOV, V. I., NIKANOROVA, L. K., GRECHKIN, N. P. and
GUBANOVA, G. S., Scientific Research Institute of Immunology, USSR Academy
of Medical Sciences, Moscow; Institute of Organic and Physical Chemistry,
Kazan' Branch, USSR Academy of Sciences

[Abstract] The synthesis of eight alkylating phosphoric acid derivatives is described. Their antiallergic activity was studied in vivo in guinea pigs and in vitro in rats, both sensitized by ovalbumin. Preliminary administration of the alkylating compounds to guinea pigs markedly inhibited the immune response. Titers in the passive cutaneous anaphylaxis test decreased. The values of the leukocyte migration inhibition test dropped from 82.8 to 25.6-20.2%. The antiallergic effect depended on the presence and number of alkylating groups, composition of the carbohydrate moiety, and was greatest in early sensitization stages. The mechanism of the antiallergic effect was inhibition of mitosis, while prevention of histamine release from mast cells depended on cell-surface receptor alkylation. Alkylating agents with two alkylating groups may have a nonspecific histamine-releasing effect on mast cells, similar in its mechanism to the histamine-secretion response to administration of a specific antigen, but not of the histamine liberator 48/80. References 17: 9 Russian, 8 Western.
[27-9307]

POLYMERS AND POLYMERIZATION

UDC 677.027.625.162(043)

FIREPROOFING TEXTILE MATERIALS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 26, No 4, Jul-Aug 81 pp 421-428

TYUGANOVA, M. A., candidate of technical sciences, Moscow Textile Institute, KOP'YEV, M. A., candidate of technical sciences, Senior Scientific Staff, "Khimvolokno" Scientific-Industrial Association, and KOCHAROV, S. A., candidate of technical sciences, Junior Scientific Staff, Problems Laboratory of the Department of the Technology of Chemical Fibers of the Moscow Textile Institute

[Abstract] Fire-retardant chemicals for textiles operate by one of two mechanisms. First are compounds such as $Al(OH)_3$ and $MgSiO_3$ which increase the temperature necessary for combustion. Second are compounds, generally containing halogens, phosphorus or sulfur, which interfere with the oxidation process itself. The most effective retardants are mixtures of halogenated compounds plus compounds containing phosphorus, antimony and other metals or phosphorus compounds plus organic bases, amines and amides which operate via both mechanisms. In general, the fire-retardant strength of halides increases in the order $F < Cl < Br < I$; the most effective retardant, however, is that compound which generates the maximum hydrogen-halide gas near the temperature of maximum breakdown of the textile polymer. Inorganic compounds considered as components with halides include As_2O_3, Bi_2O_3, $SnO_2 \cdot 2H_2O$, and $2ZnO \cdot 3B_2O_3 \cdot 3\text{-}B_2O_3$. The mechanism for the anti-combustion effect of phosphorus-containing compounds, probably based on the interference of the $P^\cdot$, $HPO^\cdot$, and $PO^\cdot$ radicals with the $H^\cdot$ and $OH^\cdot$ radicals, is different for natural and synthetic polymers. Special provisions for fireproofing woolen materials are considered together with methods for preparing the fire-retardant materials and for evaluating their effectiveness. Figures 5 (including photos of three authors); references 97: 21 Russian, 76 Western.
[154-12027]

UDC 677.494:338

ECONOMICS OF SYNTHETIC FIBER PRODUCTION

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 81 pp 6-10

FEDORENKOV, A. A.

[Abstract] The growth of chemical fiber production and an increase of production efficiency are cited as conditions for successful solution of the socioeconomic problems to meet the needs of the populace and technology for textile fibers. The rates of development and the volumes and structure of synthetic fiber production were extremely high and the average annual growth rate was 20.8 percent. The dependence of many sectors of industry on the increasing use of fiber materials with the required operating properties are outlined. An increase of labor productivity is seen as the main factor for increasing the efficiency of synthetic fiber production. Production of synthetic fibers can also be intensified while reducing the consumption of raw materials.
[130-6521]

UDC 677.494.675-126

ADVANCES IN FORMING POLYCAPROAMIDE CORD AND COMMERCIAL THREADS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 81 pp 14-18

FIL'BERT, D. V. and ANDRONOV, Ye. S.

[Abstract] The conditions for the production of polycaproamide cord and commercial threads are outlined with respect to production advances during the 1970's. The quality of the threads were improved by increasing the strength, operating characteristics and other factors. A polymer with high molecular mass and uniform properties must be reprocessed to increase the strength of the thread. The molecular mass and molecular-mass distribution largely determine the quality of the polymer. The heat treatment temperature has a direct effect on the residual shrinkage and strength of thread. Figures 7; references 19: 16 Russian, 3 Western.
[130-5521]

UDC 677.027.622.5

INVESTIGATIONS IN CHEMICAL MODIFICATION OF ARTIFICIAL AND SYNTHETIC FIBERS

Moscow KHIMICHESKIYE VOLOKNA in Russian No 3, May-Jun 81 pp 55-58

ROGOVIN, Z. A.

[Abstract] The problem of modifying chemical fibers was investigated by using methods of graft polymerization, o-alkylation and acetylation to modify natural and synthetic cellulose fibers and synthesis of different types of copolymers and polymer-like transformations of functional groups in the macromolecules of carbon-chain polymers for chemical modification of synthetic fibers. Grafting to polyamide fibers alters them in that they lose their wax-like touch and acquire a touch typical for cotton or silk articles. Chemical modification of polyamide fibers is seen as one of the basic directions of further scientific and technical progress in production of fibers used to manufacture consumer goods. Methods of chemical modification of polyester and polypropylene fibers using graft polymerization are described which improve dyeability, increase the hydrophilic nature and reduce their electrifiableness. Figures 2; references 13: 12 Russian, 1 Western.
[130-6521]

METHODS OF INCREASING PRODUCT QUALITY AT GUR'YEV CHEMICAL PLANT

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 81 pp 6-8

VAKHNENKO, V. M. and SOKOLOVA, A. G.

[Abstract] Methods of improving product quality at the Gur'yev Chemical Plant are discussed with production of two types of polyethylene. Production was achieved by converting to a continuous process of flushing polyethylene of catalyst residues in the polymerization ship, by reducing the number of units of installed equipment, by automating the process, increasing the degree of purity of the polymer suspension and reducing the ash content of the finished product and reducing the number of maintenance personnel. The productivity of the polymerization units was increased from 420 to 800 kg/hr by modernizing the heat-dissipating assembly. A Day of Quality has been instituted at the plant, which is a special form of a meeting where the results of work on maintaining the established product quality during the past month are critically analyzed. The production process maintains the quality of product through continuous monitoring by a special production group of six engineer-technicians. A production-engineering service was created in 1980 at the plant to perform the functions of timely solution and implementation of measures to manage the production process and to determine and correct the causes of rejection.
[131-6521]

PROSPECTS FOR DEVELOPMENT OF POLYOLEFIN PRODUCTION AT GUR'YEV CHEMICAL PLANT

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 81 p 8

KOLESNIKOV, Yu. N. and MAKHIN'KO, A. I.

[Abstract] Investigations are underway at the Gur'yev Chemical Plant in cooperation with scientific research institutes to develop more active catalysts, to simplify process flow diagrams, to optimize the parameters of polymer synthesis and purification processes, to increase the productivity of installations and to reduce energy expenditures in polyolefin production. A catalytic system that includes a more active recovery agent of diisobutylaluminum hydride was tested and introduced at the plant. A highly effective catalytic system based on titanium trichloride produced by low-temperature recovery of titanium tetrachloride by an aluminum-organic compound is being checked at the plant in polypropylene production. The new catalyst, besides high activity, is more stereospecific, has high bulk density, contains no dusty fraction and its particles are spherical in shape. A single-stage process for synthesis of diethylaluminum chloride used as a catalyst in ethylene and propylene polymerization has been developed and introduced at the plant. This method made it possible to intensify the production of the co-catalyst, to improve overall productivity and to reduce the consumption of the pyrophoric slurry. This resulted in an increase of the utilization factor of the initial raw material and a reduction of environmental pollution. The technology for producing a triethylvanadate catalyst has been developed for preparing a variety of polyethylene and copolymer products with high resistance to impact loads and for casting precision and large-size particles.
[131-6521]

UDC 678.675.01

PROSPECTS FOR USING AROMATIC POLYIMIDES AS HIGH-TEMPERATURE-RESISTANT POLYMER MATERIALS

Moscow PLASTICHESKIYE MASSY in Russian No 5, May 81
(manuscript received 28 Feb 80) pp 22-26

KOTON, M. M., BESSONOV, M. I. and SAZANOV, Yu. N.

[Abstract] The mechanism and kinetics of the two main stages of the main process of aromatic polyimide synthesis, consisting of prepolymer formation and conversion of polyimide acid to polyimide were studied in detail. The conditions of conducting the reactions were varied to find ways of accelerating the polyimide production process, to increase the molecular mass of the prepolymers, to produce nondefect polyimide macromolecules and to improve the mechanical properties of the polyimides. A chemical structure that contributes to formation of extended rod-like conformations of chains provides the best strength and deformation properties of the polyimides. Polyimides based on

the dianhydride of diphenyltetracarbonic acid have been produced with high thermal resistance and strength. Investigations are needed to improve the properties of known polyimides and polyimide materials by single-stage polycondensation in solution at low temperatures and in the presence of different catalysts. Figures 2; references 22: 12 Russian, 10 Western.
[131-6521]

RUBBER AND ELASTOMERS

UDC 678.742.2-134.23.074.01:539.2

EFFECT OF MOLECULAR STRUCTURE OF ETHYLENE-PROPYLENE RUBBERS ON THEIR ELASTIC PROPERTIES

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 15 Sep 80) pp 8-10

MIRONYUK, V. P., SIDOROVICH, Ye. A., AFANAS'YEV, I. D. and BROY-KARRE, G. V.,
VNIISK (All-Union Scientific Research Institute of Synthetic Rubbers)
imeni S. V. Lebedev

[Abstract] A decrease in the concentration of propylene in ethylene-propylene synthetic rubbers (EPSR) decreases the temperature of the α-transition only slightly and increases the minimum elasticity. An increase in the propylene concentration from 20 to 40% decreases the glass transition temperature from -54 to -64°C. With a further increase in the propylene from 40 to 60%, the glass transition temperature increases again to around -54°C. The coefficient of resistance to cold shows the opposite pattern: it increases with increasing propylene to 40% then decreases as the propylene concentrations continue to increase to 60%. These effects appear to be caused by the appearance of a crystalline phase in the rubber at about 40% propylene. Figures 4; references 10 (Russian).
[99-12027]

UDC (678.742-136.23+546.268.2):54-14.002.612

ELASTIC POLYUREAS BASED ON OLIGOISOBUTYLENES HAVING TERMINAL AMIDOAMINE GROUPS

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 14 Mar 80) pp 10-12

BERESNEV, V. V., YUNUSOV, O. A., KIRPICHNIKOV, P. A. and SHAKIROVA, A. K.,
Kazan' Chemical-Technical Institute imeni S. M. Kirov

[Abstract] The title material will react easily with diisocyanates forming elastic polymers with a high chemical stability. The polycondensation reaction carried out at 200°C with hexamethyldiamines results in a liquid rubber having

a molecular weight of 3215, a density at 20°C of 0.89g/cm^3, a flashpoint of 305°C, a glass transition temperature of -68°C and a dynamic viscosity at 50°C of 520 Pa·sec. The properties of the products can be altered by changing the ratio of amine and isocyanate groups. The gel-fraction appears to be absent indicating that the reaction results in linear macromolecular structures for the polymers prepared from 2,4-toluylendiisocyanate and diphenylmethane-diisocyanate. The products are stable towards water, most organic solvents and ozone, and hence may be used in aggressive environments. Figures 3; references 5 (Russian).
[99-12027]

UDC (678.762.2-19:54-14).028

HARDENING OF OLIGODIENE MIXTURES HAVING TERMINAL CARBOXYL AND EPOXIDE GROUPS IN PRESENCE OF ORGANOPHOSPHOROUS CATALYST

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 9 Apr 80) pp 15-18

OGREL', A. M., MEDVEDEV, V. P., LYAPICHEV, V. Ye. and TUZHIKOV, O. I.,
Volgograd Polytechnic Institute

[Abstract] Although the title materials have desirable mechanical properties, the long curing time is a disadvantage. Factors in the synthesis of these materials which influence the curing time are K, the ratio of epoxide to carboxyl groups in the oligomer, and the amount of catalyst. An increase in K by 3 times decreases the hardening time by a factor of 6, such that for K = 3, the curing requires only 30 min at 100°C. The concentration of the catalyst tri(hydroxymethyl)phosphine (TOMP) exerts a direct effect on the curing time only for K greater than 1.5. At lower K values, the curing time is independent of the TOMP concentration. The experimental results are consistent with a reaction mechanism involving a quaternary phosphonium salt which forms a structural network at any molar ratio of phosphine to excess epoxide (e.g., K greater than 1). Figure 1; references 12 (Russian).
[99-12027]

UDC (678.762+678.762.2.063.023.2):678.028.001.5

INFLUENCE OF TYPE OF ACCELERATOR ON VULCANIZATION STRUCTURE AND ON PROPERTIES OF RUBBER - PULVERIZED VULCANIZED RUBBER SYSTEM

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 8 Oct 79) pp 18-21

SHARAPOVA, L. N., CHEKANOVA, A. A., ZAKHAROV, N. D. and LAPSHINA, T. V.,
Yaroslavl' Polytechnic Institute

[Abstract] During sulfur vulcanization, in a system containing liquid rubber and fine particles of vulcanized rubber, sulfur from the mixture migrates into the vulcanized rubber. Vulcanizations at 143°C was used to model a three-layer system--vulcanized rubber (inner layer) and two mixtures (the outer layers, the composition of one similar to and one different from the vulcanized rubber)--to evaluate the effects of various accelerators on the partitioning of sulfur among the three components. Compared to a single-layer vulcanized rubber, the inner layer contains more total sulfur and about the same amount of free sulfur and the outer layer contains less total sulfur and about the same amount of free sulfur. The amount of sulfur which diffused into the inner layer ranges from a low of 41.9% for the fast-acting DEDTC to a high of 76.2% for the SFA which has a long incubation period. Accelerators evaluated are thiuram, zinc diethyldithiocarbamate, (DEDTD), sulfenamides (SFA) Captax, and DFG [expansion unknown]. The amount of sulfur also changes the number and character of crosslinked sulfur bonds. References 5: 4 Russian, 1 Western.
[99-12027]

UDC 678.762.2-134.352.063.019.391:620.165.29

INFLUENCE OF THERMAL AGING OF SUPEROXIDED RESINS FROM BUTADIENENITRILE RUBBERS ON SEALING PROPERTIES OF STATIONARY GASKETS

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 19 Sep 79) pp 21-23

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[Abstract] Thermal aging of surface layers (in contact with metal or air) of butadienenitrile (BDNR) causes changes in the elastic-hysteresis properties while the aging of bulk samples results in an increase in the static modulus of contraction and the accumulation of a relative residual deformation. The extent of degradation in the sealing properties increases in the order SKN-18 < SKN-26 < SKN-40. An increase in the concentration of dicumylperoxide (DCPO) in BDNR over the concentration range 0.5 to 2.0 parts per 100 parts resin improves the sealing properties of the gaskets, due to a strengthening of the adhesion of the resin to the metal and also to a decrease in the

dispersion temperature of the original resin. High concentrations of DCPO were observed on the surfaces of SKN-40 and SKN-26 exposed to both air and metal, probably influencing the cyclization of the polymer chains and accelerating the deterioration of the hermetic sealing properties. Figures 3; references 6 (Russian).
[99-12027]

UDC 678.743.41.063.01:539.538

FRICTIONAL PROPERTIES OF SKF-32 RESINS FILLED WITH COPPER POWDER

Moscow KAUCHUK I REZINA in Russian No 3, Mar 81
(manuscript received 5 Nov 79) pp 23-25

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[Abstract] The current methods of improving the frictional properties and wear-resistance of resin surfaces, such as halogenating the surfaces or introducing friction-reducing additives such as graphite, molybdenum disulfide, etc., have significant drawbacks. A new method, forming thin films of a light metal on the friction surfaces, overcomes many deficiencies of the above techniques. The friction between SKF-32 resins impregnated with 40 micron copper powder (30 wt. %) and ST-45 steel was 1.2 times to 1.6 times lower and the wearability of the Cu-resin surface 2 to 6 times greater than between the steel and the pure resin. A greater amount of Cu was observed on the surface of the steel sample with TSIATIM-201 grease than with glycerine as a lubricant. The Cu-impregnated resin surface may be used in mineral oil, fresh and salt water, and petroleum products. Figure 1; references 5 (Russian).
[99-12027]

UDC 547.315.2:678.029.776:66.012-52

CONTROLLING POLYMERIZATION OF BUTADIENE IN SKD PRODUCTION

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 7 Jul 80) pp 6-8

BRODOV, D. Yu., PODOL'SKIY, T. S., LEBEDEV, V. F. and MINENKOVA, T. I.,
All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev,
Voronezh OKBA [Experimental Design Office for Automation]

[Abstract] The title problem involved stabilizing the Mooney viscosity which could be controlled by varying the aluminum component of the catalyst, and the plasticity, which could be controlled by varying the titanium component. The change in the titanium component, M_t, was determined from the equation

$$M_t = k_1(M-M_3) + k_2(P-P_3)$$

where M and M_3 are the existing and desired Mooney viscosities, P and P_3 are the existing and desired plasticities respectively, and k_1 and k_2 are mass coefficients. From this equation, an expression was developed to calculate by computer M_t at any discrete moment. Introduction of this process has saved around 400,000 rubles/year. References 8 (Russian).
[97-12027]

UDC 678.043.678.76:546.23.546.221

SELENOSULFIDE VULCANIZATION OF UNSATURATED RUBBERS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 2 Jul 80) pp 12-13

AKHMEDOV, G. G., BABAYEV, R. Kh., SADYGOV, Sh. F. and GASANOV, T. G.,
Institute of Organochlorine Synthesis, AzSSR Academy of Sciences

[Abstract] As a vulcanizing agent, sulfur in combination with selenium overcomes some of the disadvantages of using either S or Se individually. Of the four selenosulfides of the form Se_nS_m, for n = 4 to 1 and m = 4 to 7, the SeS_7 showed the best behavior. The strength under tension and stress under 400% elongation were 10 and 3 MPa higher for resins vulcanized with SeS_7 than for those vulcanized with either sulfur or a mixture of sulfur plus selenium. The use of SeS_7 with SKI-40 and SKS-30ARKM-15 resin mixtures results in controlled vulcanization at relatively low temperatures. Figure 1; references 2 (Russian).
[97-12027]

UDC 678.4:763.2.539.2

FEATURES IN STRUCTURE OF VULCANIZED RUBBERS BASED ON ISOPRENE-CHLOROPRENE RESIN MIXTURE

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 7 Jul 80) pp 14-16

LYAKIN, Yu. I., SHERSHNEV, V. A., KULEZNEV, V. N. and IZOTOV, V. I.,
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[Abstract] A study was made of the interactions at the phase boundaries in vulcanized rubbers based on mixtures of polyisoprene (SKI-3) and either linear (Nairit P) or branched (Nairit VS) polychloroprene (PC). Seven compounds or mixtures were used as vulcanizing agents: zinc oxide, magnesium oxide, mercaptobenzthiazol, diphenylguanidine, sulphenamide TS, stearic acid, and

sulfur. Change in specific volume (SV) increases with % elongation (E) up to 300%, indicating the presence of some residual solid particles, and decreases with increasing amounts of Nairit from 5 to 20%. The stress for %E up to 500% increases with increasing weight % Nairit in SKI, from about 1.2 MPa for pure SKI-3 to about 2.5 MPa for 20% Nairit + 80% SKI-3. This does not appear to be related to a change in the degree of crystallinity. Significant differences in the strength of two-layer samples to resist separation are observed only at high rates of deformation (greater than 100 mm/min). Figures 5; references 7: 6 Russian, 1 Western.
[97-12027]

UDC 678.742.2

STRUCTURE AND PROPERTIES OF SKETS VULCANIZED RUBBER PREPARED IN PRESENCE OF MODIFIED VULCANIZING AGENTS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 6 May 80) pp 16-19

LOBACHEVA, G. K., CHALYKH, A. Ye., IL'IN, M. I. and MATVEYEV, V. V.,
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[Abstract] An evaluation was made of the effects on strength, hardness, chemical stability in aggressive environments, dynamic characteristics and color of resins mixed with 1 weight % dicumylperoxide (DCP) and 1 to 20 wt % 2-methyl-5-vinylpyridine + $ZnCl_2$ (MVP+ZC) as vulcanizing agents. Rather complex behavior is observed for the physical properties which can be divided into three regions: two regions of small monotonic changes for MVP+ZC less than 5% and greater than 12% and an intermediate region of large and variable changes. This indicates that the rubbers are heterogeneous and contain discrete systems. X-ray analysis confirms a three-stage mechanism for the formation of structures in the vulcanized resins. The increased strength of the vulcanized materials is apparently associated with a spreading of the mechanical energy which normally causes fractures over a wider area by the interaction with dispersed-phase particles having a high modulus of elasticity. Particles with diameters less than 0.1 to 0.2 microns play the largest role in dispersing the energy. Figures 4; references 5 (Russian).
[97-12027]

UDC 678.762:678.043:678.028.3

CHANGE IN STRUCTURE AND PROPERTIES OF RESINS BASED ON NK DURING PROLONGED VULCANIZATION IN PRESENCE OF VULCANIZING SYSTEMS CONTAINING SULFUR AND BYSMALEIMIDE

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 5 Feb 79) pp 20-23

CHAVCHICH, T. A., KLIMKINA, T. P., KOSTENKO, A. M. and BORODUSHKINA, Kh. N., NIIKGSh [Scientific Research Institute of Kinetics and Combustion?]

[Abstract] A study was made of the vulcanization kinetics, structure of the vulcanizing network, and the chemical properties of the cross-linking bonds for resins containing NK (100 parts), stearic acid (2.0 parts), zinc oxide (3.0 parts), sulfur (1.5 parts), sulphenamide TS (1.0 part), and m-phenylbismaleimide (MPBM; 1 to 4 parts). Increasing the MBPM concentration from 1 to 4% at 138°C for 50 min increases the fraction of bonding, decreases the number of reaction chains but does not affect the strength of the final material; at 155°C for 200 min, the same increase in MBPM results in increasing values of all three parameters. MBPM decreases the intramolecular addition of sulfur and increases the fraction of monosulfide and carbon-carbon bonds, thereby providing a more stable spatial orientation of the network. Resins were also vulcanized for 1000 min at 130°C. The kinetics studies indicate that the resin mixtures containing MBPM are characterized by a wide vulcanization plateau. Such polymers have a higher stress at 300% elongation, strength under tension, and resistance to tearing than resins containing sulfur and N,N'-dithiodimorphalin. Figures 3; references 8: 6 Russian, 2 Western.
[97-12027]

UDC 678.076:(531 + 537)

CORRELATION OF DIELECTRIC AND PHYSICO-MECHANICAL PROPERTIES OF RESINS BASED ON BUTADIENE-NITRILE RUBBERS DURING AGING PROCESS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 24 Sep 79) pp 25-27

YEZERSKAYA, M. N., ANGERT, L. G. and GRIGOR'YAN, A. G., Scientific Research Institute of the Resin Industry

[Abstract] The title study was conducted in order to evaluate the use of the dielectric constant as a quick and easy quality control method. The relative elongation E and the microhardness H were measured periodically on samples of SKN-26M resin aged in air at 130°C for 15 days. E shows a monotonic decrease of 4 to 6 fold while H shows a monotonic increase of about 50%. The characteristics of the kinetics for the change in tg δ, the tangent of the angle of dielectric loss, is related to both aging and frequency. At low frequencies,

more advanced aging results in lower values of tg δ. A table lists a set of equations at different frequencies of the form $K_{tg} = 1 + BK_E$ or $K_{tg} = 1 + B\log K_E$, where K_{tg} is the coefficient of thermal aging calculated from tg δ, K_E is the coefficient of relative elongation, and B is a constant. This method is more sensitive than that based on an evaluation of H. Figures 4; references 5: 4 Russian, 1 Western.
[97-12027]

UDC 678.023.334

INFLUENCE OF MIXING PARAMETERS ON TECHNOLOGICAL PROPERTIES OF CIS-ISOPRENE RUBBERS CONTAINING FILLERS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 11 Mar 80) pp 40-42

MEYLAKHS, L. A., GORELIK, R. A., GRIDUNOV, I. T. and PROKOPOV, N. I., "Kauchuk," Intergovernmental Organization and Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov

[Abstract] An evaluation was made of the interrelationships among such rubber values as the maximum (M_{max}) and minimum (M_{min}) twisting moment, the energy (E) and heat (ΔT) of mixing, the length of time the industrial carbon was ground (γ), workability (λ), Mooney viscosity (M_t), cohesion strength (CS), increment of viscosity decrease (ΔM_t), concentration of carbon-rubber gel (CRG) and its stability towards deformation. An increase in the activity of filler increases M_{max}, M_{min}, M_t, E, ΔT, and ΔM_t. Increasing the latter two, as well as increasing the specific surface area of the carbon, result in a greater tendency twwards mechanical breakdown. Mixing parameters such as rate of stirring, stirring time, degree of mixing, etc., exert an effect primarily due to temperature change, which seems to be the factor most influential in determining the basic technological properties of the resins. An increase in temperature improves λ, shortens the induction period for vulcanization, and reduces the relative rate of vulcanization. Figures 2; references 7: 5 Russian, 2 Western.
[97-12027]

UDC 678:4.338.516.52

IMPROVING SYSTEMS FOR WHOLESALE PRICING OF RESIN MIXTURES

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 21 Sep 79) pp 53-55

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[Abstract] In 1977-1978, about 1200 resin mixtures were available. They were divided into two groups: the first containing resins based on natural, isoprene, and nitrile materials and the second, those based on sodium butadiene, styrol, and chloroprene materials. The price was based on the % of each type of resin in the mixture. A new system involves a functional classification of the resin mixtures according to TU 38-1051082-76 and TU-38-0051166-73, which define 13 resin mixture classifications based on the properties of the mixtures and their use (e.g., having stability against air, cold, solvents, light, ozone, wear, etc.). The actual wholesale price (TS) is determined from the equation

$$TS = (1+R)S_{ras}$$

where R is the standard profitibility and S_{ras} is the net cost calculated from the equation

$$S = a_o + a_1C_{rets}$$

where a_o is the fixed cost (for rolled mixtures, $a_o = 0.16$ ruble; for glazed mixtures, 0.24 rubles); a_1 (=1.04) is a regression coefficient characterizing an average expense, and C_{rets} is the price of the resin based on the established tables [TN:literally "prescription card"]. This system provides for pricing based on actual use and type (rolled or glazed), for equal profitibility for various mixtures, for a stable price structure, and for flexible wholesale prices. References 2 (Russian).
[97-12027]

FIRE HAZARD AND TOXICITY OF INDUSTRIAL CHEMICALS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81 pp 55-56

[Abstract] Two compounds are considered: 2,4,6-tri-tert-butylphenol (I) and ethylacetate (II). (I) is a white crystalline powder used as a stabilizer for clear synthetic resins. Bulk density is 360-380 kg/m^3 and melting temperature 129-130°C. The maximum permissible level, MPL, is 50 mg/m^3. Workers handling this material should use respirators to protect respiratory organs. Fires involving (I) should be extinguished with water spray or chemical foams. The material should be stored in a dry heated area during the winter at a temperature below 35°C. Compound (II) is a colorless liquid used as a solvent in the

production of glues and paints. Density is 881 kg/m^3 and the melting, boiling, flash point, and spontaneous combustion temperatures are -83.6, 77.1, 2, and 400°C respectively. The lower and upper temperature limits for combustion in air are 1 and 31°C respectively. The MPL is 200 mg/m^3. Workers handling this material should use appropriate articles to protect the skin under conditions of balanced ventilation. Fires involving (II) should be extinguished with chemical or pneumatic-mechanical foams, carbon dioxide extinguishers or inert gas. (II) is classified as a flammable liquid and should be stored in a warehouse designed for such chemicals.
[97-12027]

UDC 678.762.2:539.52

ELASTOPLASTIC PROPERTIES OF LINEAR CIS-POLYBUTADIENE AS A FUNCTION OF ITS PARTICLE SIZE DISPERSION

Moscow KAUCHUK I REZINA in Russian No 4, Apr 81
(manuscript received 8 Sep 80) pp 9-11

NEDOYNOVA, L. A., GRECHANOVSKIY, V. A., PODDUBNYY, I. Ya. and KOVRIZHKO, L. F., Voronezh Plant for Synthetic Rubber imeni S. M. Kirov; All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev

[Abstract] It had been shown (authors, 1969, 1972) that Mooney viscosity of cis-polybutadiene (CPB) decreases with increase in particle size dispersion (PSD)--from 2.96 for the monodispersion polymer to 1.67 for the polymer with a more probable ($M_w/M_n = 2$) molecular weight distribution (MMR). Three series of mixtures of synthesized samples of CPB--a polymer industrially available under the trademark SKD-1--were prepared. The samples as synthesized had different molecular weights; the mixtures were adjusted to have different PSDs. The MMRs of the mixtures were assayed on an ultracentrifuge G = 120 by rate of sedimentation of the polymer in solvent. PSD of the mixtures was determined from the MMR curves. Measurements were made of Mooney viscosity (at temperatures 20 and 100°C), plasticity, elasticity and cold flow of the linear CPB. The effect of variation in PSD on Mooney viscosity (graphically) and on the elastoplastic properties (tabulation) is presented. Even slight addition of a low molecular weight fraction to the monodispersion polymer, with simultaneous increase in the high MW fraction--to maintain the average molecular weight--decreased polymer viscosity. Equations are derived to show the functional relationship of the elastoplastic properties of the linear CPB and its PSD. Elastic recovery of linear CPB increases with increase in PSD. Figures 4; references 7: 5 Russian, 2 Western.
[97-12027/8586]

UDC 678.063.9:677.46.061.043

MODIFIERS OF POLYFUNCTIONAL ACTION FOR TIRE RUBBER

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA
IMENI D. I. MENDELEYEVA in Russian Vol 26, No 5, Sep-Oct 81
(manuscript received 10 Apr 81) pp 115-116

ALEKSEYEVA, I. K., PRASHCHIKINA, A. S., ESAULOVA, A. V., SHVARTS, A. G.,
LYKIN, A. S., ANDREYEV, L. V., BUKANOV, I. G. and YEVSTRATOV, V. F.,
Scientific Research Institute of the Tire Industry

[Abstract] Modification of polymers by means of polyfunctional chemical additives is one of the most effective ways of improving the quality of tire rubber. Some of the best additives consist of derivatives of isocyanates and maleic imides. In the present report effects of two such additives on a rubber and rubber-cord system have been described viz., N,N'-metaphenylenebismaleimide (I) and the modifier TK (II) consisting of a mixture of 2,4- and 2,6-toluylenediisocyanate blocked with ε-caprolactam). The composition of rubber containing I and II modifiers is simplified because many commonly used components are not needed. Both I and II are capable of forming thermally-stable cross-linkages between the rubber molecules as well as between the molecules of rubber and the cord. The sulfur cross-linking is prevented in the early vulcanization stages, minimizing the subvulcanization process. Laboratory and road tests show that the addition of I and II to the rubber increases its degree of vulcanization, improves resilience-hysteresis and fatigue properties and extends the useful life of the end product. No references.
[41-7813]

SLIPPERY RUBBERS

Moscow ZNANIYE-SILA in Russian No 5, May 81 p 32

SILIN, A., doctor of technical sciences

[Abstract] A new friction-free elastomer AE (slippery rubber) for use as a construction material in underwater drilling devices, automobile construction, surgery, clock manufacture and pipeline construction is described. The new material has been prepared by a method which reduces, to the theoretical limit, the energy of the individual bond. It is used for special processing of rubber engineering articles by scientists at the All-Union Scientific Research Institute of Optical-Physical Measurements of State Standard Specifications and at the USSR Academy of Sciences Institute of Chemical Physics; it reduces friction between rubber and metal 10 fold and more. AE is used to hermeticize watches at the First Moscow Clock Plant imeni S. M. Kirov and the Minsk PTS [expansion unknown] "Integral." A shop in Kurivich (L'vov Oblast) is producing the material for supply to the entire Soviet section of the main pipeline "Druzhba." The material withstands long storage and use in air, fresh water and sea water.
[45-2791]

MEMBRANE METHODS OF WASTE PURIFICATION

Riga SOVETSKAYA LATVIYA in Russian 22 Oct 81 p 2

[Article by V. Golubev, candidate of chemical sciences, senior scientific associate of the Institute of Inorganic Chemistry of the Latvian SSR Academy of Sciences: "Prompted by Nature"]

[Text] The problem of environmental protection is becoming increasingly acute. The population of the planet's cities are growing; new industrial enterprises are being built, and as a result the amount of waste water is increasing. With increasing frequency people are pondering the question of how to preserve the purity of the atmosphere, the verdure of grasses and the limpidity of rivers for future generations.

It is no secret to anyone that water is the most common and essential substance on Earth. Total reserves of it amount to about one and a half million cubic meters. Fresh water comprises approximately two percent of this volume, and the amount available for practical use in human life does not exceed 0.003 percent. At the same time, fresh water resources--rivers, lakes, artificial reservoirs--are very unevenly distributed. Hence it is impossible to be reconciled with the fact that the industrial, household and drainage effluents released into natural reservoirs result in the unfitness of a source of natural fresh water.

Many substances contained in effluents cause the death of fish and their food resources and also of the microoganisms which participate in the self-purification processes of rivers and lakes. These substances complicate the use of waste waters for irrigation of fields. This is why great attention is being given to measures for protection of reservoirs in our country. At the 26th CPSU Congress the goal of protecting the environment and, in particular, of "improving technological processes with the object of reducing discharges of noxious substances" was termed among the most important orientations of the 11th Five Year Plan. In this connection, researchers and engineers are giving increasingly greater attention to modification of prevailing, and development of new, methods of processing industrial wastes. One of the lines of exploration is use of membrane methods.

Biological membranes--the thin, fine barriers which separate cells from each other in the organism--are familiar to us from our school days. They ensure directed migration of substances essential to man from the external environment into the cell and vice versa. Without membranes, respiration, blood circulation, protein synthesis and food assimilation would be impossible... Scientists have long been striving to apply these properties of living barriers--the transmission of some substances and the retention of others--in order to solve many technical tasks. Practically speaking, however, only recently, when our knowledge of the nature and structure of substances was expanded and progress was achieved in the production of synthetic polymers, has it been possible to realize this idea. The wide variety of materials used to form membranes--both ceramic, glass, cellulose acetate and polymer semipermeable films and liquid and solid ion-exchanging materials and biological lipid structures--resulted in varied implementation of membrane processes. But despite its youth, the technology itself belongs to an extremely promising trend and is gaining increasingly greater recognition.

As is common knowlege, today enterprises are compelled to expend enormous amounts of capital on the construction of complex purification installations. The hundreds of sedimentation tanks, traps, tanks, kilometers of pipes and thousands of units of machinery sometimes account for one-third of the basic production capital. And membrane technology requires 8-10 times less capital than other methods of purification--chemical, biological, mechanical... It is distinguished by its efficiency, the simplicity of the equipment and the possibility of conducting the process of separating mixtures at normal temperatures. At the same time the utilization of valuable by-products--substances dissolved in effluents--becomes profitable.

Experience amassed by scientists and engineers indicates that the most effective of the methods of membrane technology are the processes of reverse osmosis, ultrafiltration and electrodialysis. The first two have much in common--the same inert multipermeable barriers and the same apparatuses. And the impetus of the processes is the difference in the pressures on both sides of the membrane, although the mechanism of these two processes is different. Solid and liquid ion-exchanging materials are used in electrodialysis--if the solution is placed in an electrical field, these filters have the capacity to transmit only positive or negative ions, and in the same direction.

In our country, equipment has been developed for reverse-osmotic and ultrafiltration processes; the waste waters of electroplating plants can be demineralized with their use. Reverse osmosis is also highly promising for purification of waste waters in the food and medical industries. Use of such equipment at the automobile plant imeni Leninskiy Komsomol in Moscow, the Minsk motorcyle and bicycle plant, the Kishinev refrigerator plant and a number of other enterprises shows that the effectiveness of purification may be as high as 85-98 percent. At the same time the purified solutions contain toxic substances within the range of sanitary norms, and the necessary ecological effect is thus achieved.

The electrochemical methods in membrane technology make it possible to eliminate additional outlays of reagents, create continuity of the technological purification process and, most important, they are convenient to control--only the electrical parameters of the membrane process must be changed. Thus, if a membrane is permeable only for positively charged particles or only for negatively charged ones, it is possible to extract ions of toxic metals, for example, mercury, lead, cadmium and others, from a solution by electrodialysis. In this case the effectiveness of purification is completely dependent on the ion selectivity of the polymer membranes.

The complexity of obtaining highly productive and selective membranes, the strength of which is inadequate, to some extent hinders their wider application.

Hence, both in our country and abroad, a search is going on for new types of ion-exchanging materials. The scientists of Soviet Latvia are also working in this direction. Study of the properties of liquid ion-exchanging membranes during application of an electrical field to them was first begun in this country at the electrochemistry laboratory of the Latvian SSR Academy of Sciences Institute of Inorganic Chemistry. Research conducted by the coworkers of the laboratory under the direction of Academician B. Purina of the Latvian SSR Academy of Sciences showed that using the unique property of liquid membranes, particularly their high ionic selectivity--which, moreover, may be purposefully set by introducing highly selective extracting agents and organic complexing agents to the liquid membranes--it is possible to manage the membrane process in a purposeful manner, including effective purification of different waste waters from admixtures of a single, in the given case toxic, component. Other membranes are ineffective in these conditions.

This is of great significance for the creation of wastefree technology, environmental protection, and also for obtaining valuable products from wastes, particularly metal salts. The scientists of the institute are now working on electrodialysis equipment with selective liquid membranes, capable of purifying waste waters of varying compositions of toxic admixtures of heavy metals.

Today the membrane methods already have an important place in the control of environmental pollution. And in the future this technology, which is distinguished by the compactness of the equipment, low energy consumption and small capital outlays, is receiving universal dissemination. Life requires this.

9380
CSO: 1841/31

UDC 628.541.183.23

EFFECT OF DISSOLVED ORGANIC SUBSTANCES ON SEMIPERMEABLE MEMBRANES AND METHODS OF STABILIZING THEIR REVERSE OSMOTIC PROPERTIES

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 3, No 3, May-Jun 81
(manuscript received 3 Jun 80) pp 204-207

SRIBNAYA, V. P. and KUCHERUK, D. D., Institute of Colloidal Chemistry and Chemistry of Water imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] The literature was studied to determine the dependence of reverse osmosis characteristics of membranes on the chemical properties of organic substances present in solution. The presence of organic materials can result in two types of membrane contamination of reversible and irreversible osmosis. The reverse osmosis process is disrupted with both types of contamination, the service life of the membrane is reduced and the productivity of the installation is reduced as well. A combination of various physicochemical methods such as coagulation of suspended solids, filtration through a sand filter and adsorption purification of the solution are recommended as methods to prevent contamination of the membrane. The technological parameters of existing reverse osmosis units can be improved if the chemical properties of the dissolved organic substances and suspended impurities are properly taken into account. References 37: 10 Russian, 27 Western.
[137-6521]

UDC 66.064-944-278:532.5

SOME PRINCIPLES OF LIQUID FLOW THROUGH PORES OF REVERSE OSMOSIS MEMBRANES

Moscow TEORETICHESKIYE OSNOVY KHIMICHESKOY TEKHNOLOGII in Russian Vol 15, No 4, Jul-Aug 81 (manuscript received 18 Sep 79) pp 614-617

FOMICHEV, S. V., KOCHERGIN, N. V. and GERVITS, V. M., Moscow Chemical Engineering Institute imeni D. I. Mendeleyev

[Abstract] Equations were derived that describe water flow in electrolyte solutions and organic substances through the micropores of reverse osmosis membranes. The equations were based on the theory of the absolute rate of reactions and concepts on bound water at the liquid-solid phase interface. The relative permeability constant of water,in solutions of different salts, as a function of a complex varying with the nature of the dissolved salt, inverse temperature in a 1 percent sodium chloride solution, activity of the initial solution and molar volume and density of dissolved alcohols, was studied to calculate the main parameters of the membrane apparatus. The equations were found to be in satisfactory agreement with experimental data over a wide range of variation of physical properties, concentrations and temperatures. Figures 4; references 11: 4 Russian, 7 Western.
[133-6521]

MISCELLANEOUS

UDC 547.738.088.8

NOVEL HIGHLY CONDUCTIVE COMPLEXES OF TETRATHIOTETRACENE WITH TETRAHALOPHENOQUINONES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51, No 10, Oct 81 (manuscript received 14 Jul 80) pp 2306-2308

STARODUB, V. A., GLUZMAN, Ye. M., GOLOVKINA, I. F., ZASLAVSKAYA, G. S. and KRIVOSHEY, I. V., Khar'kov State University imeni A. M. Gor'kiy

[Abstract] One of the more important requirements for charge transfer complexes (CTC) is rather high but incomplete transfer of the charge, about 0.6-0.8 e. Other characteristics include high polarizability of the components of CTC, relatively low ionization potential of the donor and high affinity for the acceptor electron. The present article reports results of the study of complexes of tetrathiotetracene with tetrachloro- and tetrabromodiphenoquinones obtained by direct addition of the components in chlorobenzene or benzonitrile. These complexes showed high electroconductivity as indicated by IR spectra and direct electrophysical measurements. Two acceptor forms have been postulated for such complexes: an neutral one and a cation-radical form: $...A^-A^-A^oA^-A^-... \rightarrow A^-A^-A^-A^oA^-....$ This makes it possible to transfer the electron by the relay mechanism. References 5: 3 Russian, 2 Western.
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